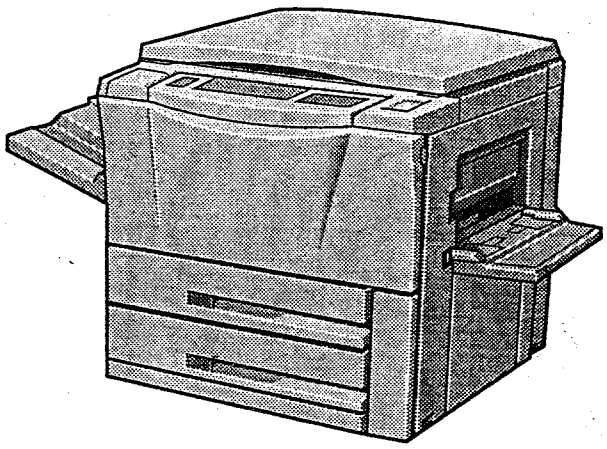
SHARP SERVICE MANUAL

CODE: 00ZSF1025SM/E



MODEL SF-1025

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Parts marked with "⚠" is important for maintaining the safety of the set. Be sure to replace these parts with specified ones for maintaining the safety and performance of the set.

SHARP CORPORATION

This document has been published to be used for after sales service only.
The contents are subject to change without notice.

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[1] PRODUCT OUTLINE

1. The SF-1025 is a medium class copier that produces 20 to 30 copies per minute.

2. Target users

Average copy volume: 3,000 to 8,000 copies/month
Usage: 1,000 to 10,000 copies/month

3. Features

(1) Compact body

① Small body size

② Use of a front loading paper tray and the folding single manual paper feed table.

(2) Clean copy production without contaminating environments

① Consideration was given during design in order to avoid contamination against ozone and dust. Considerations were also made for recycle paper, packaging, and recycling of machine elements after the use.

② Low level of machine noise.

(3) Service, maintenance, and installation enhancement

① Adoption of the paper feed roller

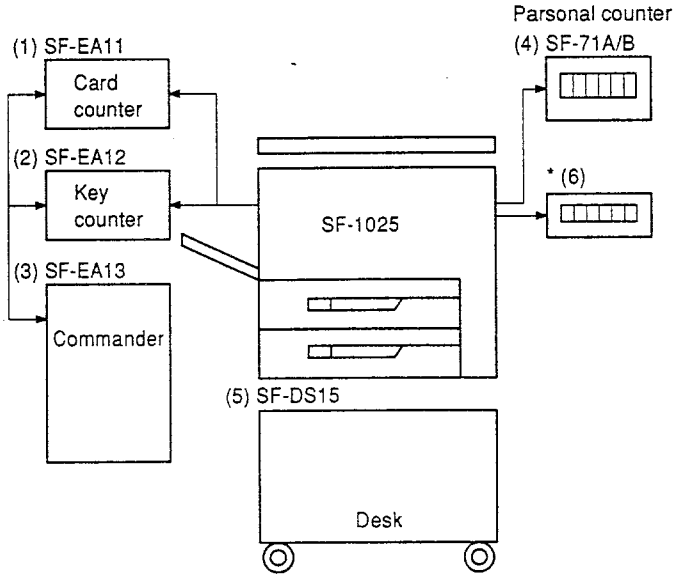
② Easy installation and reduced maintenance time
(Internal power supply for option units)

	SF-8300 series		SF-1025
Body:	48 min	→	About 40 min
Maintenance	70 min	→	About 55 min

③ Easier replacement of consumable

④ Adoption of the toner save mode

4. Composition (Including options)



Specifications of options

(1) SF-EA11

Name	Card counter
Input method	Optical card reader
Number of controlled accounts	200 accounts, maximum
Maximum number of copy numbers stored	Maximum 99999 for an account Maximum 999999 for all accounts
Display capacity	16 columns x 2 rows
Power source	Supplied from the copier, with data backed up by the internal battery.
Dimensions and weight	92mm wide, 100mm deep, 33mm high, about 210 grams

(2) SF-EA-12

Name	Password protected auditor
Input method	Password entry on the keypad
Number of controlled accounts	500 accounts, maximum
Maximum number of copy numbers stored	Maximum 99999 for an account Maximum 999999 for all accounts
Display capacity	16 columns x 2 rows
Power source	Supplied from the copier, with data backed up by the internal battery.
Dimensions and weight	92mm wide, 100mm deep, 33mm high, about 210 grams

(3) SF-EA13

Name	Counter commander
Printing method	Serial dot matrix thermal printer, 24 columns x 1 row
Printer paper	Thermal paper in roll (Sharp SD-275PR)
Power source	Supplied form the copier
Dimensions and weight	92mm wide, 226mm deep, 58mm high About 390 grams

(4) SF-71A (COUNTER)
SF-71B (SOCKET)

(5) SF-DS15 (DESK UNIT)

(6) OTHER

Mechanical counter

(Service part: CCOUM0024FC31 (999,950) Initial value
CCOUM0024FC32 (000,000) Initial value)

[2] PRODUCT SPECIFICATIONS

1. Basic specification

(1) Type

Desktop

(2) Copy method

Dry static copier

(3) Kinds of originals

Maximum original size	A3, 11" x 17"
Original alignment	Center and left
Use of an original sensor	Not used

(4) Copy speed

A4/Letter	25 sheets/min

	Normal	Enlargement (Ratio)	Reduction (Ratio)
A3	13 sheets/min	9 sheets/min (200%)	10 sheets/min (50%)
B4	16 sheets/min	9 sheets/min (200%)	12 sheets/min (50%)
A4 (Portrait)	25 sheets/min	12 sheets/min (200%)	19 sheets/min (50%)
A4 (Landscape)	19 sheets/min	10 sheets/min (200%)	15 sheets/min (50%)
W letter	13 sheets/min	9 sheets/min (200%)	10 sheets/min (50%)
Legal	16 sheets/min	9 sheets/min (200%)	12 sheets/min (50%)
Letter (Portrait)	25 sheets/min	12 sheets/min (200%)	19 sheets/min (50%)
Letter (Landscape)	19 sheets/min	10 sheets/min (200%)	15 sheets/min (50%)

(Note) Copy speeds indicated in the enlargement and the reduction modes are the slowest speeds in the respective mode.

(5) First copy time

5.5 sec (Paper feed port: Upper tray)
6 sec (Paper feed port: Lower tray)
4.5 sec (Manual paper feed)

(6) Warmup time

About 90 seconds
(Without pre-heat feature)
Misfeed recovery time: 8 seconds, provided that it is in the standard condition in 60 seconds after leaving the door open.

(7) Multicopy

Maximum multicopy number: 99 sheets

(8) Magnification ratio

Fixed ratio	AB series: 4R+4E; 200, 141, 122, 115, 100, 86, 81, 70, 50%
	Inch series: 4R+4E; 200, 141, 129, 121, 100, 95, 77, 64, 50%
Zooming range	50 to 200% (1% increments)

(9) Exposure

Exposure mode	Auto, manual, photo
Exposure system	Slit exposure and moving optical system (fixed original table)

(10) Paper feed

Copy size (maximum ~ minimum)	AB series:	A3 to A6R
	Inch series:	11" x 17" to 8½" x 5½"
Method	Two tray + single manual feed	
Capacity	500 + 500 sheets	

AB series

Paper entry	Paper size	Paper weight	Size selection	Side, front
Upper tray	A4/A4R/B4/A3 When shipping: A4	56 ~ 80g/m² 15 ~ 21 lbs.	Selection by way of guide replacement or by the service engineer	Front, drawer integrated
Lower tray	A4/A4R/B4/A3 When shipping: A3	56 ~ 80g/m² 15 ~ 21 lbs.	Selection by way of guide replacement or by the service engineer	Front, drawer integrated

Inch series

Paper entry	Paper feed size	Paper weight	Size selection	Side, front
Upper tray	8½" x 11", 8½" x 11" (R), 8½" x 14", 11" x 17" When shipping: 8½" x 11"	56 ~ 80g/m² 15 ~ 21 lbs.	Selection by way of guide replacement or by the service engineer	Front, drawer integrated
Lower tray	8½ x 11", 8½" x 11" (R), 8½" x 14", 11" x 17", 8½" x 5½" When shipping: 11" x 17"	56 ~ 80g/m² 15 ~ 21 lbs.	Selection by way of guide replacement or by the service engineer	Front, drawer integrated

Manual feed

Paper size	AB series Inch series	A3 to A6R 11" x 17" to 8½" x 5½" Min. size (W/L 100mm x 139.7mm)
Size detection	No	
Paper weight	Single feed mode	52 to 128 g/m² (14 to 34 lbs) (A4 size or under, if above 105 g/m²) (or 28 lbs)
Kind of paper		Standard, Sharp designated paper, OHP

(11) Developing method

Dry, two components magnetic brush method

(12) Charge method

(–) DC saw-teeth electrode method

(13) Transfer method

(–) DC Corotron method

(14) Separation method

AC Corotron method

(15) Fusing method

Heat roller method

(16) Cleaning method

Blade method

(17) Light source

Halogen lamp

(18) Blanking areas

Void area	3mm from the lead edge
Image loss	3mm at maximum during the actual (1:1) copy mode

(19) Paper eject and finishing

Capacity of paper receive tray	250 sheets

(20) Additional features

	Availability of feature	
APS	No	
AMS	No	
Margin shift	Yes	10mm shift (¼")
DPCM	Yes	Enlarge not permitted
Edge erase	Yes	7 to 12mm wide
Monochrome	No	

APS: Auto paper selection
AMS: Auto magnification ratio selection
DPCM: Dual page copy mode

Frame delete

AB series		Inch series	
Size	Deleted width (mm)	Size	Deleted width (mm)
A3	11.5±3	11" x 17"	11.5±3
B4	9.5±3	8½" x 14"	7 ±3
A4	11.5±3	8½" x 11"	11.5±3
A4R	10 ±3	8½" x 11" (R)	7 ±3

(21) Power supply

Voltage: 110V, 120V, 127V, 220V, 230V, 240V
Frequency: 50/60Hz, universal

(22) Power consumption

Maximum power consumption: 1.5KW, maximum
Standby power consumption: 0.05KW with the heater lamp inactive; 0.85KW with the heater lamp active.

(23) Appearance

WxDxH (mm)	600 x 650 x 567 (at the top of the table glass) 600x 650 x 607 (at the top of the original cover)
Occupied area (W x D in mm)	1082 x 650 (with the paper receive tray and manual feed bypass open
Weight: Main body	About 66.8Kg (145lbs)

(24) Accessories

Destination	SEEG	Agents AB	Agents Inch
Drum	Separate pack	Some in separate pack	Some in separate pack
Developer (Black)	×		
Installation toner	×		
Document cover	Standard provision		
Upper cleaning roller	○		
Paper exit tray	○		
Document table	×		
Toner collection container	○ (4 pcs.) One is installed when shipping.		
Operation Manual	No	English/French/Arabic, typical examples	English/Spanish, typical examples
Dust cover	×	○ (Partial)	
Condition label	Attached to the document cover when shipping.		
Quick finder list of magnification ratio	○		
Maintenance card	○		
Key sheet	Corresponds to pictures and characters.		

2. Consumables

SF-1025 supplies list (SEEG)

No.	Item	Contents	Life	Model Number	Packing Unit	Note mm/Kg
1	Drum	OPC drum x 1	80.0K	SF-222DM	10	
2	Developer	Developer (850g) x 10	80.0K (x 10)	SF-222LD1	1	(SF-222DV1) x 10 = SF-222LD1
3	Toner	Toner (260g) x 10	6.5K (x 10)	SF-125LT	1	(SF-125T) x 10 = SF-125LT
4	80K Maintenance Kit	Upper cleaning roller x 1 Cleaner Blade x 1 Toner Disposal Box x 4 Separation Pawl (Upper) x 4 Separation Pawl (Lower) x 2 Screen Glid x 1 Charging plate unit x 1 Drum Separation Pawl Unit x 1	80K	SF-222KA	1	
5	160K Maintenance Kit	Upper Heat Roller x 1 Lower Heat Roller x 1 Toner Receiving Seal x 1 Developer Seal x 1 Heat Roller Gear x 1	160K	SF-222KB	1	

SF-1025 supplies list (Agent: Asia, Central and South America)

No.	Item	Contents	Life	Model Number	Packing Unit	Note mm/Kg
1	Drum	OPC drum x 1	80.0K	SF-222DR	10	
2	Developer	Developer (850g) x 10	80.0K (x 10)	SF-222CD1	1	(SF-222DV1) x 10 = SF-222CD1
3	Toner	Toner (260g) x 10	6.5K (x 10)	SF-125CT	1	(SF-125ST) x 10 = SF-125CT
4	80K Maintenance Kit	Upper cleaning roller x 1 Cleaner Blade x 1 Toner Disposal Box x 4 Separation Pawl (Upper) x 4 Separation Pawl (Lower) x 2 Screen Glid x 1 Charging plate unit x 1 Drum Separation Pawl Unit x 1	80K	SF-222KA	1	
5	160K Maintenance Kit	Upper Heat Roller x 1 Lower Heat Roller x 1 Toner Receiving Seal x 1 Developer Seal x 1 Heat Roller Gear x 1	160K	SF-222KB	1	

SF-1025 supplies list (Agent: Middle East, Africa)

No.	Item	Contents	Life	Model Number	Packing Unit	Note mm/Kg
1	Drum	OPC drum x 1	80.0K	SF-222DM	10	
2	Developer	Developer (850g) x 10	80.0K (x 10)	SF-222LD1	1	(SF-222SD1) x 10 = SF-222LD1
3	Toner	Toner (260g) x 10	6.5K (x 10)	SF-125LT	1	(SF-125T) x 10 = SF-125LT
4	80K Maintenance Kit	Upper cleaning roller x 1 Cleaner Blade x 1 Toner Disposal Box x 4 Separation Pawl (Upper) x 4 Separation Pawl (Lower) x 2 Screen Glid x 1 Charging plate unit x 1 Drum Separation Pawl Unit x 1	80K	SF-222KA	1	
5	160K Maintenance Kit	Upper Heat Roller x 1 Lower Heat Roller x 1 Toner Receiving Seal x 1 Developer Seal x 1 Heat Roller Gear x 1	160K	SF-222KB	1	

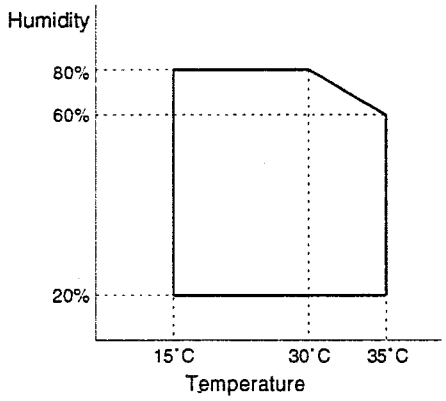
Note) Supplies of SF-2022/27 can be used with SF-1025 except toner.

3. Environmental requirements

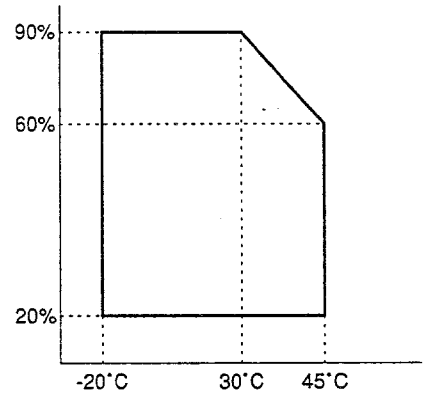
Conditions required for proper operation of the machine, as well as assurance of copy quality, the following are requested.

① Standard conditions
Recommended temperature range at 20 to 25 Centigrade (68 to 77 degrees F) and humidity range at 65 ± 5%RH.

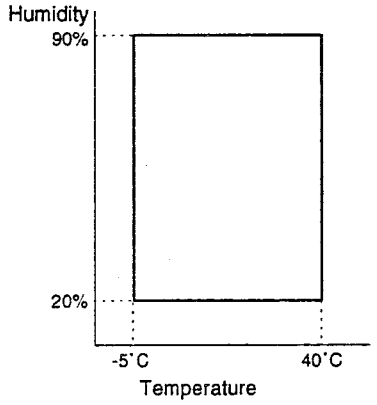
② Operating conditions



③ Shipping conditions

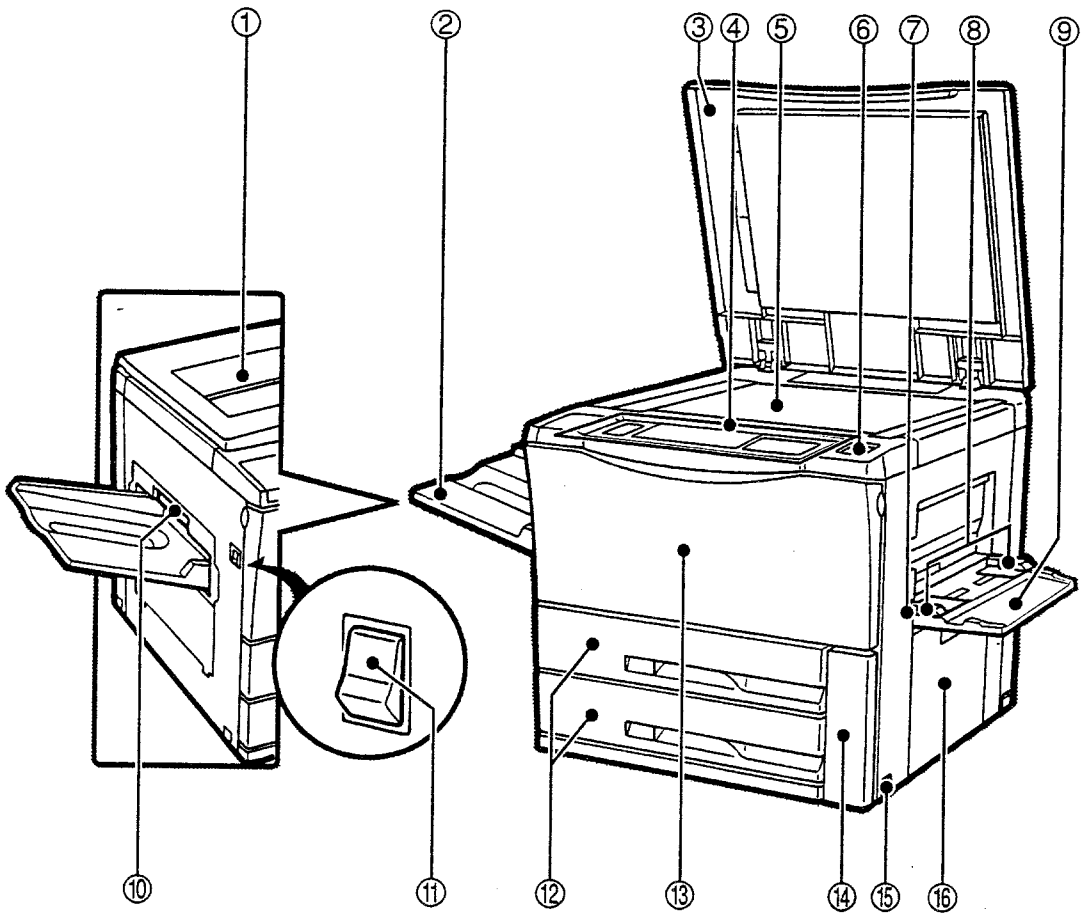


④ Consumables storage conditions

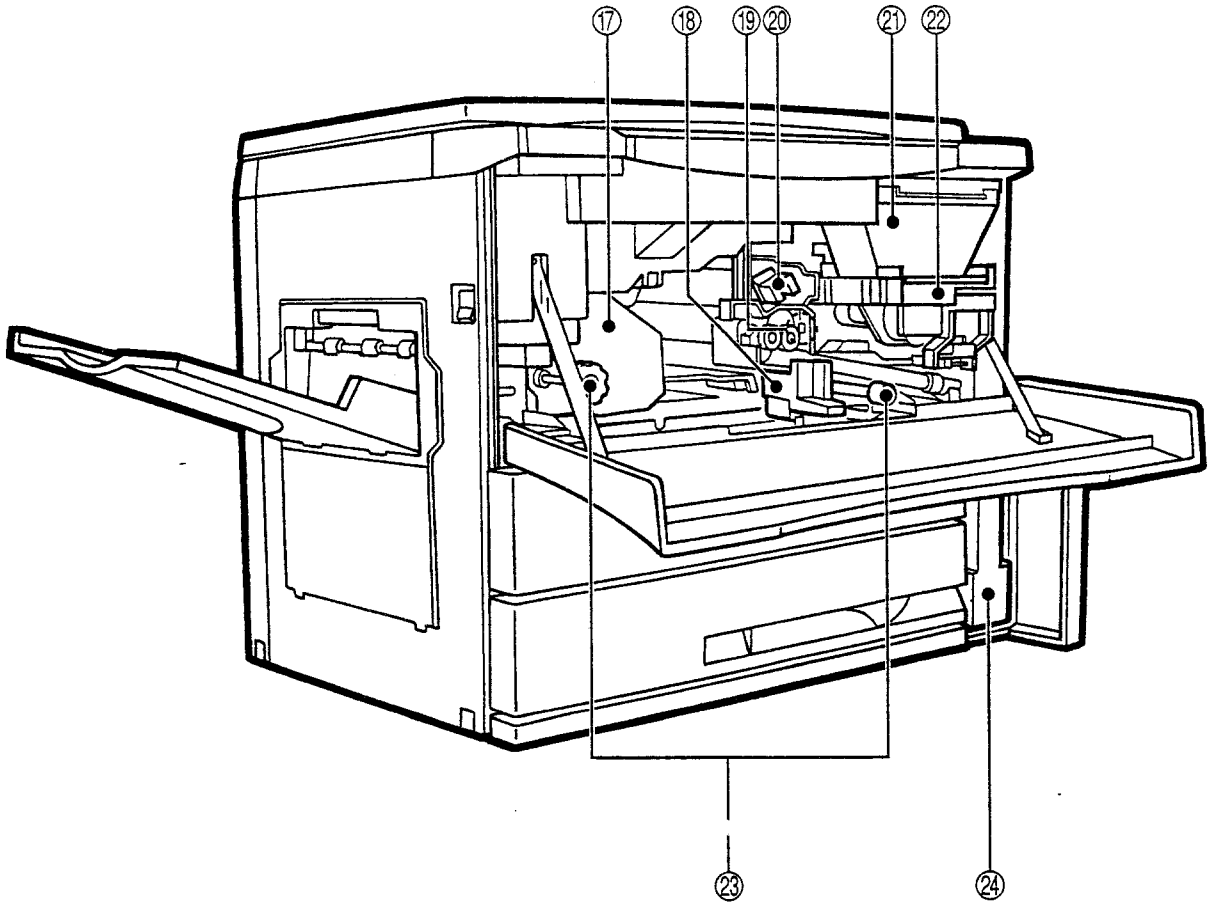


[3] COMPONENT IDENTIFICATION

1. External view

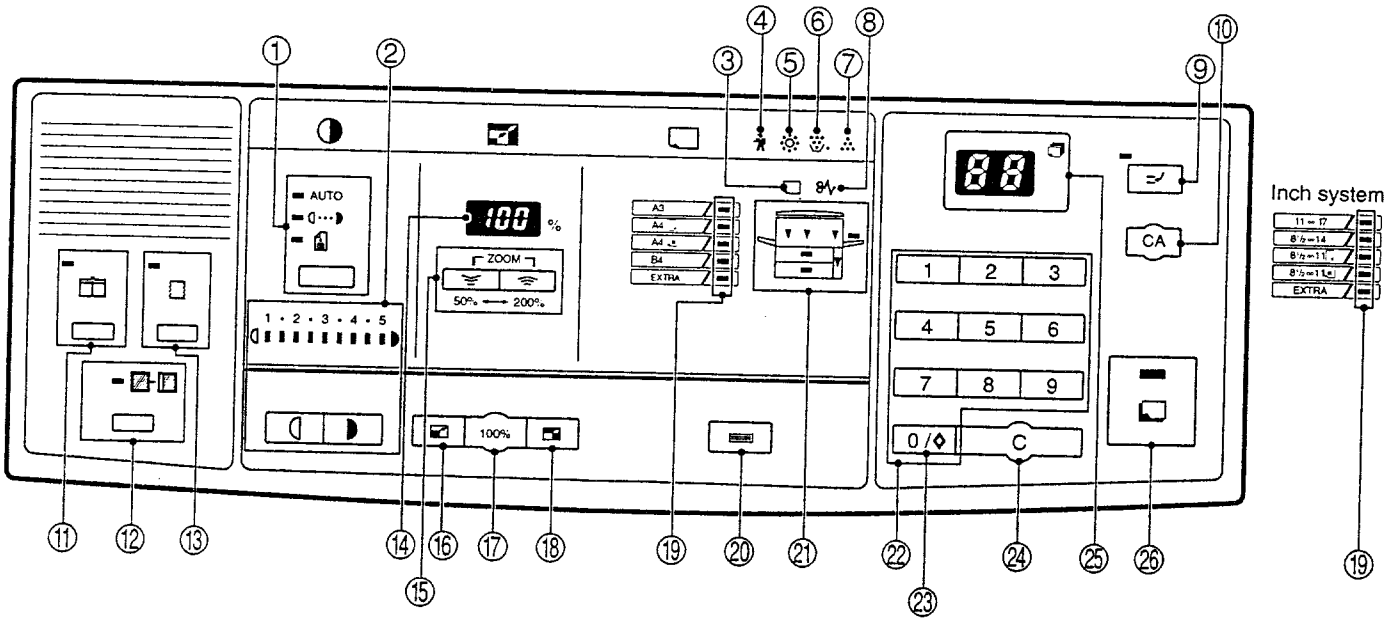


①	Document holder	②	Exit tray	③	Document cover
④	Operation panel	⑤	Document glass	⑥	Paper clip tray
⑦	Manual feed release button	⑧	Manual feed tray paper guides	⑨	Manual feed tray
⑩	Exit area cover	⑪	Power switch	⑫	Paper trays
⑬	Front cover	⑭	Toner collecting container cover	⑮	Handles
⑯	Side panel				



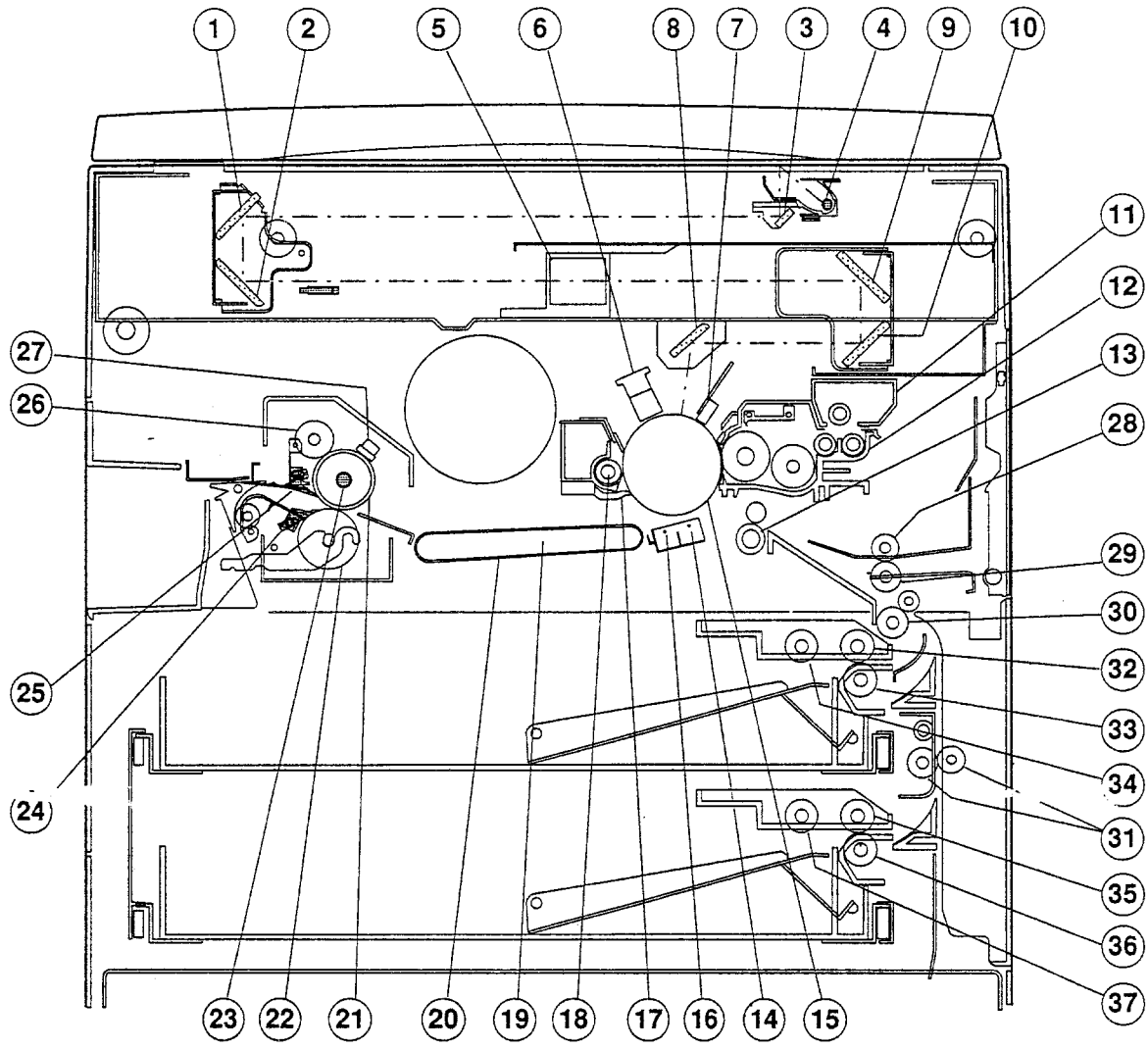
⑰	Fusing unit	⑱	Transport lever	⑲	Photoconductive drum
⑳	Corona unit	㉑	Toner hopper	㉒	Developing unit
㉓	Roller rotating knobs	㉔	Toner collecting container		

2. Operation panel



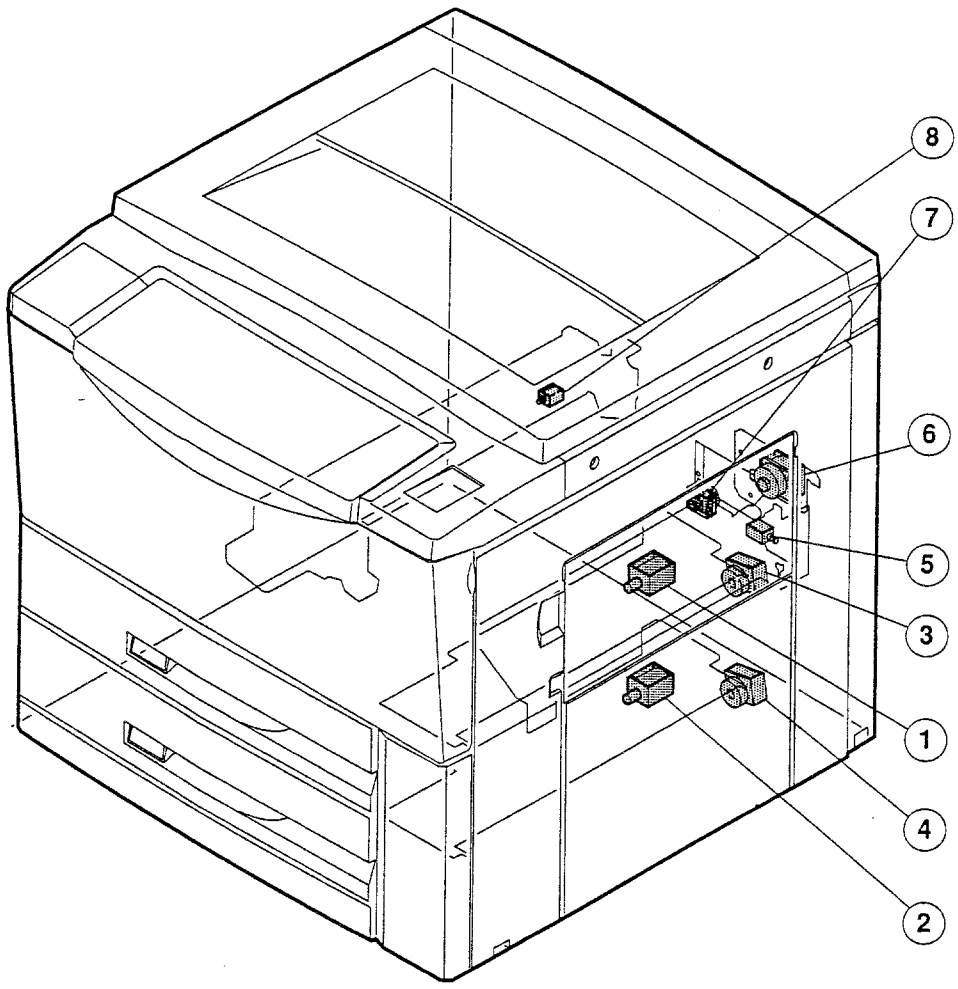
①	AUTO/MANUAL/PHOTO key and indicators	②	LIGHT and DARK keys and exposure indicators	③	Paper required indicator
④	Maintenance required indicator	⑤	Developer replacement required indicator	⑥	Toner collecting container full indicator
⑦	Toner required indicator	⑧	Misfeed indicator	⑨	INTERRUPT key and indicator
⑩	CLEAR ALL key	⑪	DUAL PAGE COPY key and indicator	⑫	MARGIN SHIFT key and indicator
⑬	EDGE ERASE key and indicator	⑭	COPY RATIO display	⑮	ZOOM keys
⑯	REDUCTION key	⑰	SAME-SIZE key	⑱	ENLARGEMENT key
⑲	Paper size indicators	⑳	TRAY SELECT key	㉑	Paper feed location/misfeed location indicators
㉒	10-key pad	㉓	ZERO/READOUT key	㉔	CLEAR key
㉕	Copy quantity display	㉖	PRINT button and READY indicator		

3. Internal view



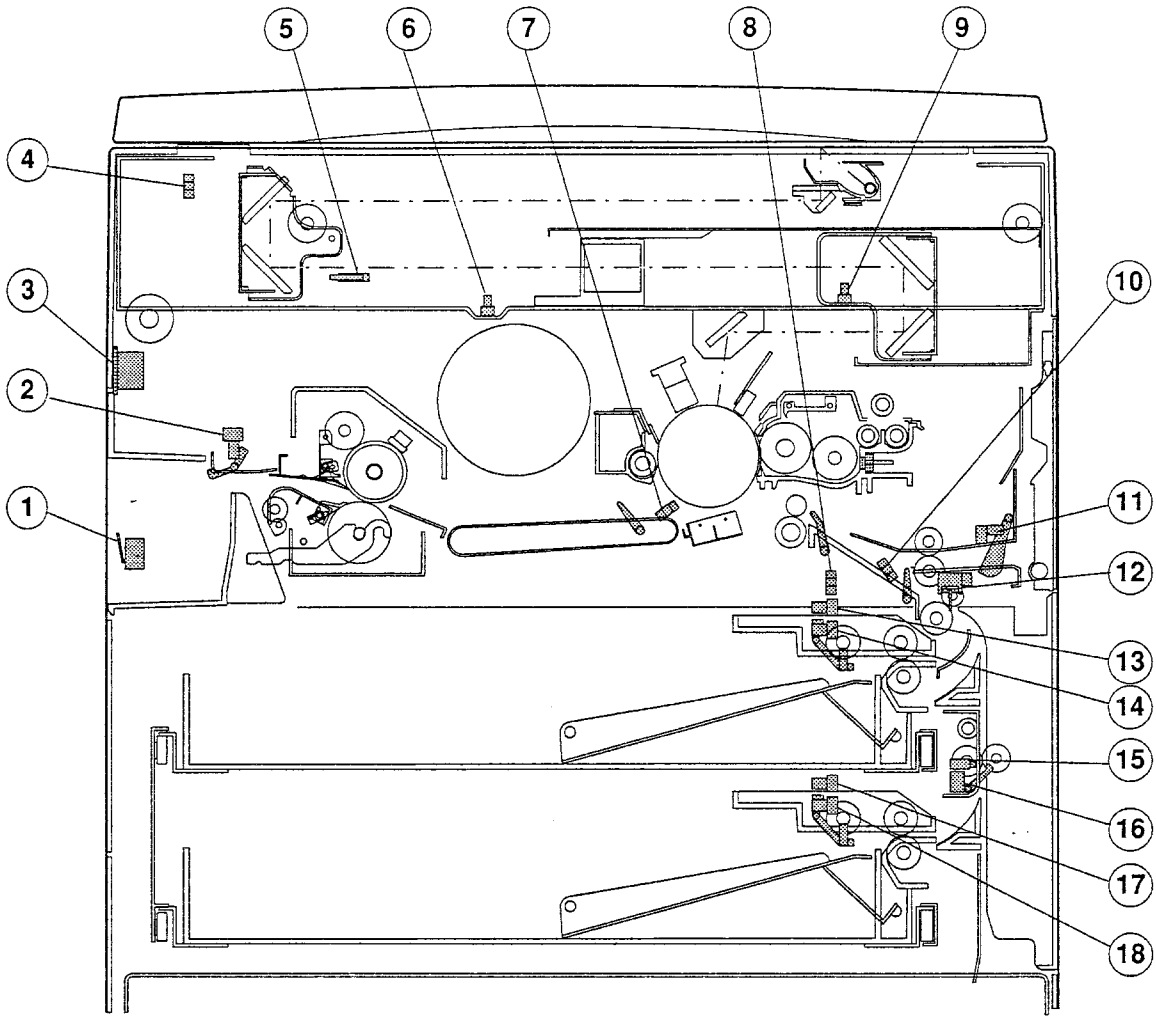
①	#2 mirror	②	#3 mirror	③	#1 mirror
④	Copy lamp	⑤	Lens unit	⑥	Main corona unit
⑦	Blank lamp	⑧	#6 mirror	⑨	#4 mirror
⑩	#5 mirror	⑪	Developing tank toner box	⑫	Developing tank
⑬	Resist roller	⑭	Transfer corona	⑮	Drum
⑯	Separation corona	⑰	Drum separator pawl	⑱	Cleaner unit
⑲	Suction unit	⑳	Suction belt	㉑	Upper heat roller
㉒	Lower heat roller	㉓	Heater lamp	㉔	Lower separator pawl
㉕	Upper separator pawl	㉖	Upper cleaning roller	㉗	Fuser thermistor
㉘	Manual feed paper feed roller	㉙	Manual feed follower roller	㉚	Transport roller (upper)
㉛	Transport roller (lower)	㉜	Upper paper feed roller	㉝	Retard roller
㉞	Upper paper takeup roller	㉟	Lower paper feed roller	㊱	Retard roller
㊲	Lower paper takeup roller				

4. Clutches, solenoids



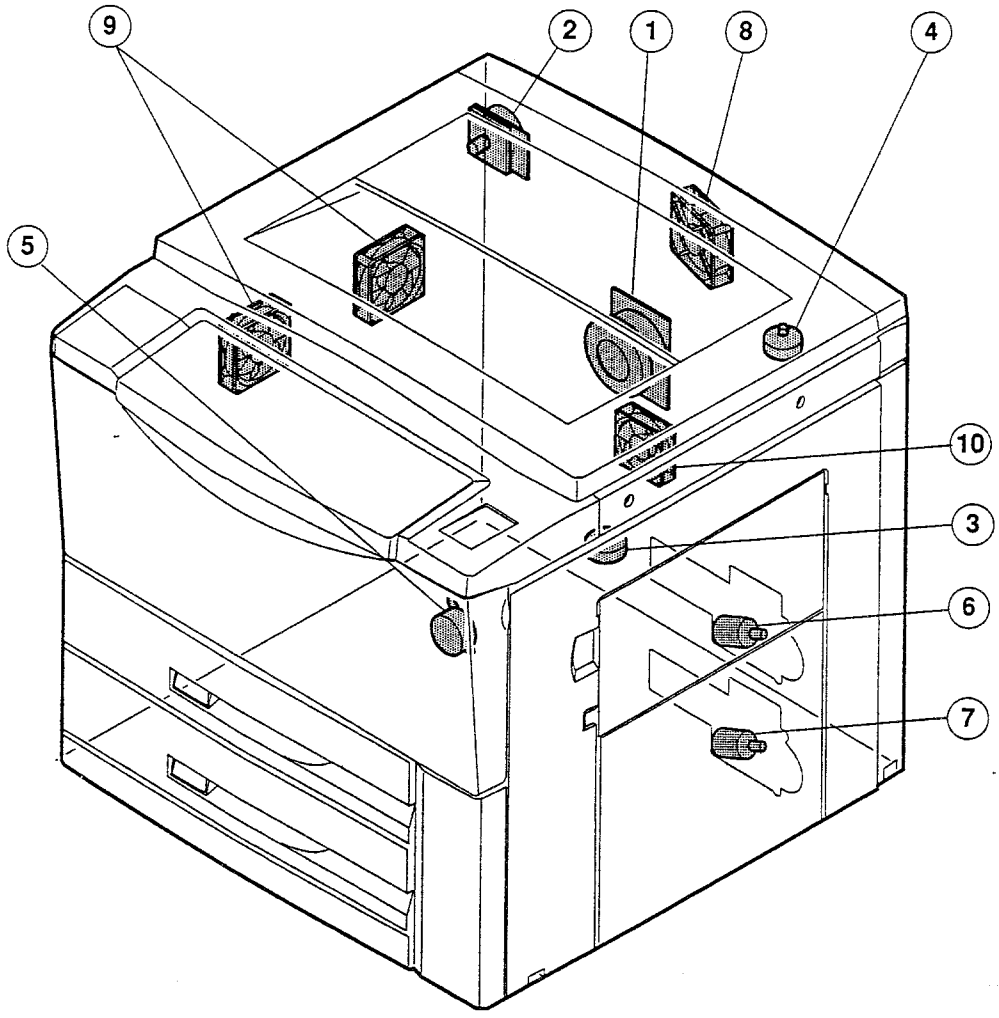
	Signal name	Name	Function
①	CPFS1	Upper tray paper feed solenoid	For tensioning takeup roller
②	CPFS2	Lower tray paper feed solenoid	For tensioning takeup roller
③	CPFC1	Upper tray paper feed clutch	For actuating paper feed roller
④	CPFC2	Lower tray paper feed clutch	For actuating paper feed roller
⑤	MPFS	Manual paper feed solenoid	For tensioning takeup roller
⑥	TRC	Transport roller clutch	For actuating transport roller
⑦	RRC	Resist roller clutch	For actuating resist roller
⑧	PSPS	Paper separation solenoid	For actuating paper separation solenoid

5. SF-1025 sensors



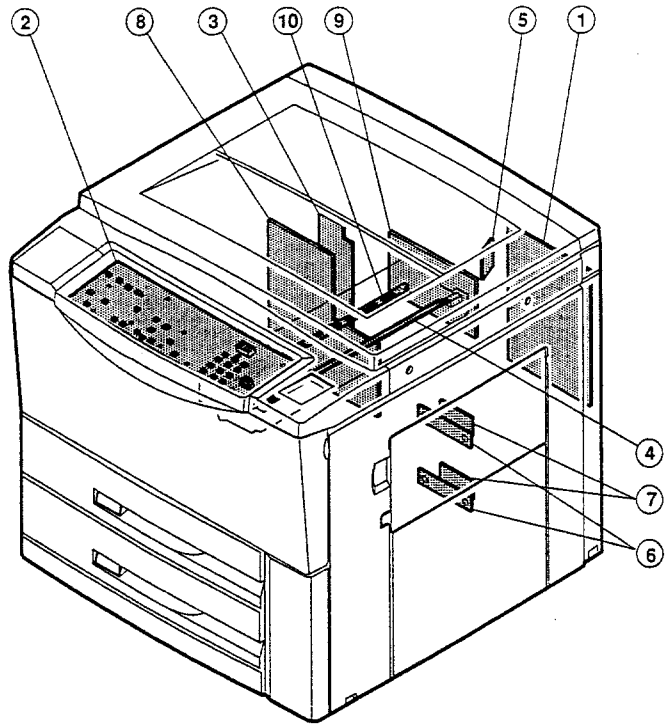
	Name	Type	Function	Output
①	CSWL	Microswitch	Cover switch, (left)	On when closed
②	POD	Transmissive photosensor	Paper exit sensor	Low when paper passes over
③	P-SW	See-saw switch	AC power switch	—
④	MHPS	Transimissive photosensor	Mirror home position sensor	High when scanner at home postion
⑤	CSWF	Microswitch	Cover switch, (front)	On when closed
⑥	LHPS	Transimissive photosensor	Lens home position sensor	Low when lens at home postion
⑦	PSD	Transimissive photosensor	Paper separation sensor	High when paper passes over
⑧	PPD2	Transimissive photosensor	Paper transport sensor	Low when paper passes over
⑨	MBHPS	Transimissive photosensor	Mirror home position sensor	Low when mirror at home position
⑩	PPD1	Transimissive photosensor	Paper transport sensor-1	Low when paper passes over
⑪	PED1	Transimissive photosensor	Manual feed paper sensor	Low when paper passes over
⑫	TFD	Transimissive photosensor	Full waste toner sensor	Low when full waste toner detected
⑬	LUD1	Transimissive photosensor	Upper tray liftup sensor	Low when lift plate detected
⑭	PED2	Transimissive photosensor	Upper tray paper sensor	Low when paper detected
⑮	CSWR	Microswitch	Doorswitch (right)	On when closed
⑯	PID	Transimissive photosensor	Paper transport sensor	High when paper passes over
⑰	LUD2	Transimissive photosensor	Lower tray liftup sensor	Low when lift plate detected
⑱	PED3	Transimissive photosensor	Lower tray paper sensor	Low when paper detected

6. Motors



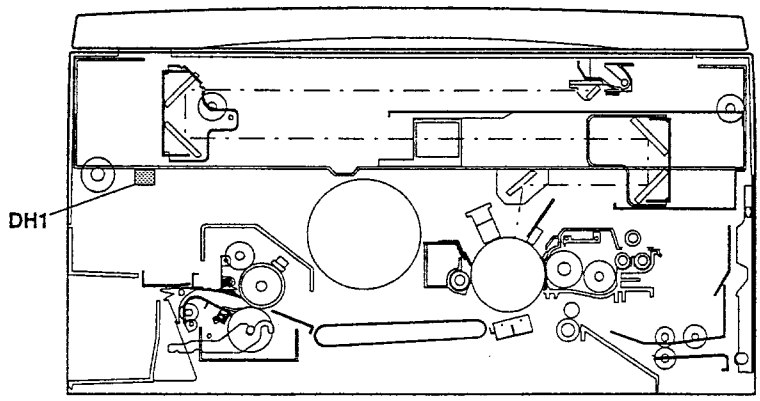
	Signal name	Name	Type	Function
①	MM	Main motor	DC, brushless	Driving copier and ADU option
②	SM	Mirror motor	DC, brushless	Driving optical system mirror bases A and B
③	LEM	Lens motor	DC, stepping	Driving optical lens
④	MBM	#4/5 mirror base motor	DC, stepping	Driving optical mirror base C
⑤	TM	Toner motor	DC, synchronous	Supplying toner
⑥	LUM1	Upper cassette liftup motor	DC, brush	Lifting upper paper feed cassette baseplate
⑦	LUM2	Lower cassette liftup motor	DC, brush	Lifting lower paper feed cassette baseplate
⑧	CFM	Cooling fan motor	DC, brushless	Cooling optical system
⑨	VFM	Ventilation fan motor	DC, brushless	Ventilating fuser area
⑩	SFM	Suction fan motor	DC, brushless	Ventilating process unit area

7. Board list



	Name	Type	Note
①	Main PWB	Common	Controlling mains
②	Operation PWB	Common to Japan models, export 2022, 2027	Controlling operator input, display
③	AC PWB	Common to Japan models, export 100V, 200V	Supplying AC power
④	Blank lamp PWB	Common	Controlling blank lamps
⑤	AE PWB	Common	Automatic exposure sensor
⑥	Tray paper size PWB	Common	Sensing tray paper size
⑦	Liftup motor PWB	Common	Driving paper tray bottom plate liftup
⑧	DC power supply unit	100V/200V series	Supplying DC power
⑨	High voltage transformer	Common	Supplying process unit high voltage and developing bias voltage
⑩	Discharge lamp	Common	Driving discharge lamps

8. Dry heater

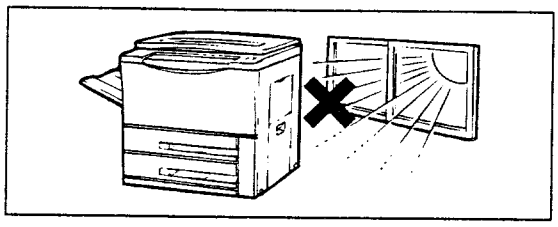


[4] INSTALLATION

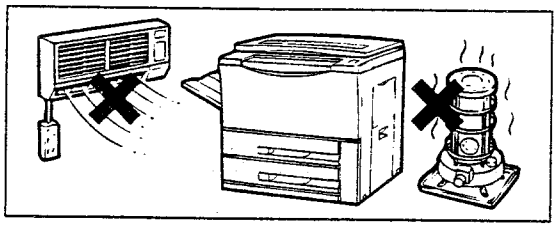
1. Installing conditions

(1) Machine environment

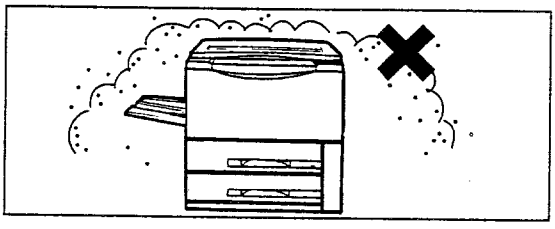
① Avoid Installation in direct sunlight or bright locations near the window.
Direct sunlight may cause damage to components and the original cover deformation. Frosted glass may also produce the same effect.



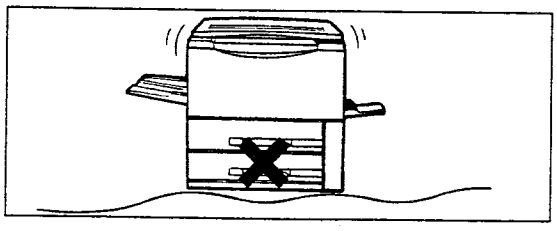
② Avoid installation in a hot or damp area, or where rapid changes in humidity occur. (For example; near an air conditioner.)
This may cause paper to dampen, or frost to form inside the copier, and may lead to a misfeed and deterioration in copy quality.



③ Avoid installation in a place where dust or vibration is encountered.
Dust deposit inside the copier may lead to a deterioration of copy quality or machine trouble.

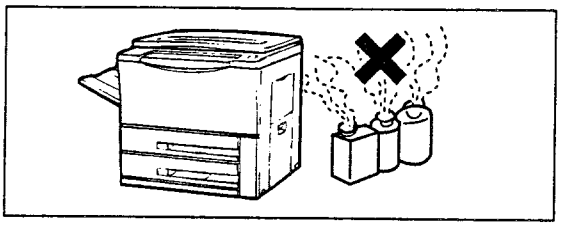


④ Do not install the copier on an unstable or uneven floor. This copier must be placed on a level surface to permit proper functioning.



⑤ Avoid installation in a place where the ventilation or air circulation is poor.

⑥ Never install the copier near inflammable materials or in the presence of ammonia fumes.
Installation near a diazo copy machine may lead to a deterioration of copy quality or machine malfunction.



⑦ Install the copier near a wall outlet.

(2) Space around the copier

The copier must be installed at least 10cm away from the wall in order to permit fan ventilation and to allow proper machine operation.

(3) Machine table

Install the copier on a level surface using the water level (UKOGM0054CSZZ).

IMPORTANT: Installing the copier on an unlevel surface may effect copy quality an machine performance.

(4) Power source

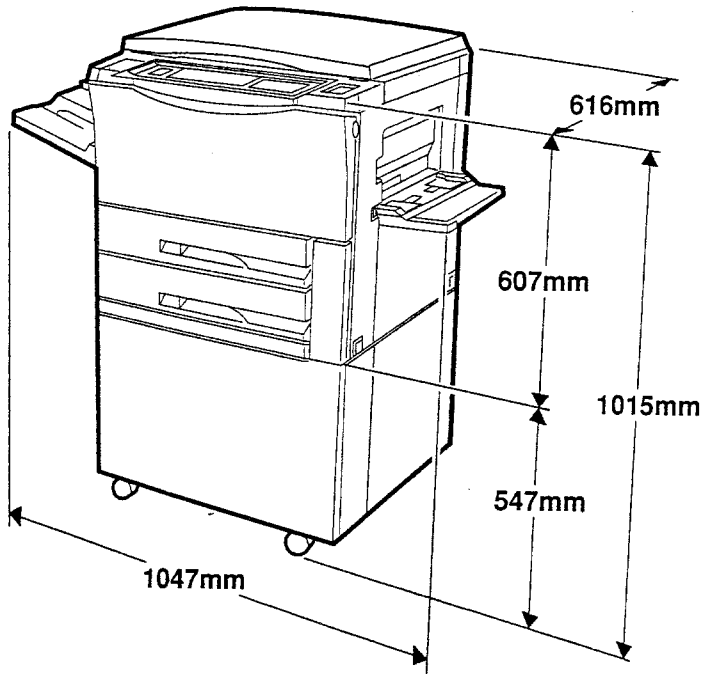
① The power supply line should have a capacity of more than 15A, capable of supplying more than 90% of the rated voltage at full load.

② Do not use an extension cord, or operate any other equipment from the same wall outlet.

(5) Ground connection

To avoid electrical hazard, use the properly grounded wall outlet only.

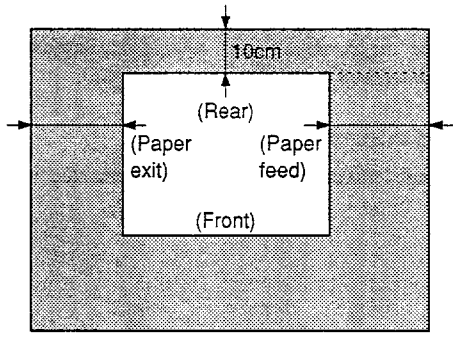
2. Installation space



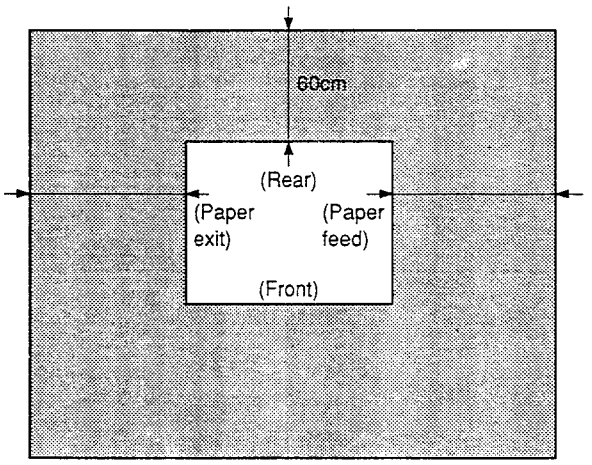
When installing the machine, ventilate with the cooling fan properly and assure enough space for proper operations.

Space required for servicing (maintenance)

(When the copier can be moved:)



(When the copier is fixed:)



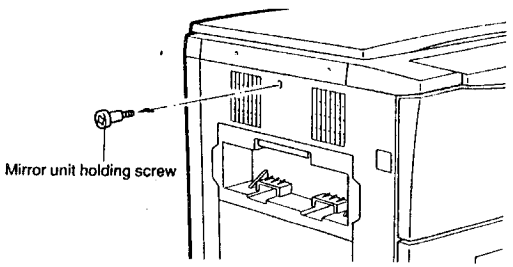
3. Installation procedure

(1) SF-1025

1. Releasing optical locks

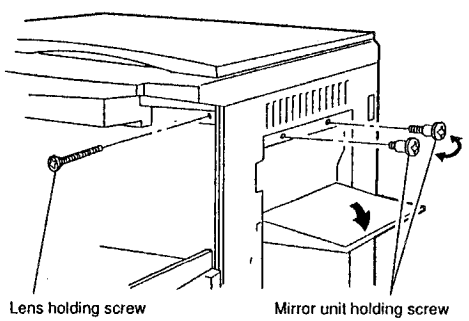
A Removing the #2/3 mirror unit lock

Unfasten the screw that holds the #2/3 mirror unit on the left side of the machine.



B Releasing the lens and #4/5 mirror unit from lock

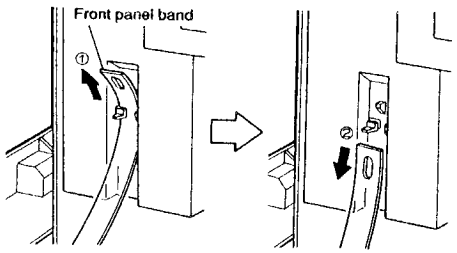
Open the paper feed tray and remove two screws that hold the #4/5 mirror unit.
Open the front panel and remove one screw that holds the lens under the operation panel.



2. Fuser unit set up

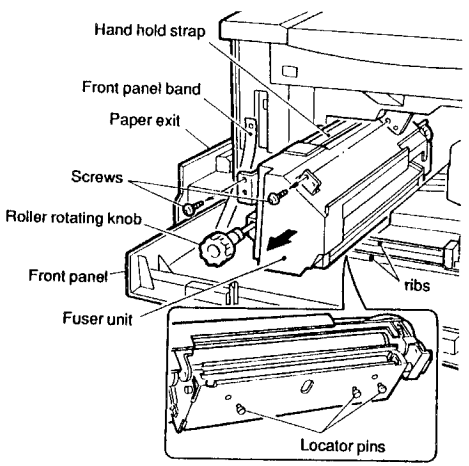
A Removing the fuser unit

① While holding up the paper exit handle, open the paper exit cover.
Remove the front panel band as shown in the figure.



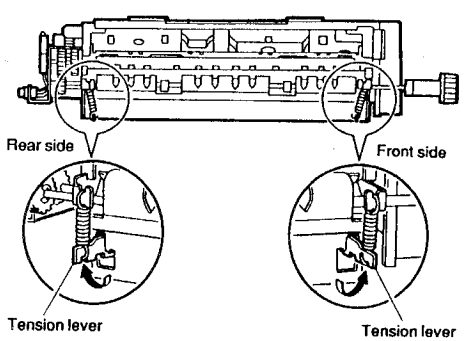
② Remove the fuser unit holding two screws.

③ Hold the fuser unit rotating knob, and gently remove it. Do not let the locator pins undr the fuser unit hit the ribs on the front cover.
Hold the fuser unit hand carry strap and remove the fuser unit.



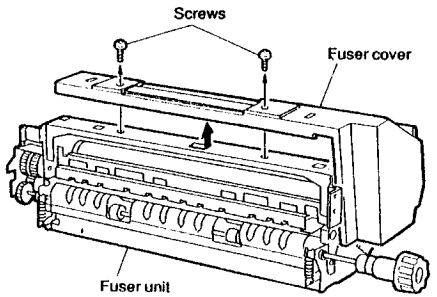
B Tensioning the heat roller

Move the tension levers on both sides of the fuser unit to the position shown in the figure. With this, tension is applied to the upper and lower heat rollers.



C Installing the cleaning roller

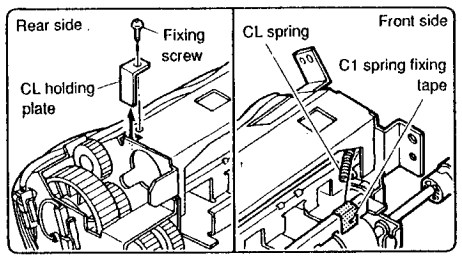
① Remove two screws that hold the fuser cover, and slide the fuser cover to front then lift.



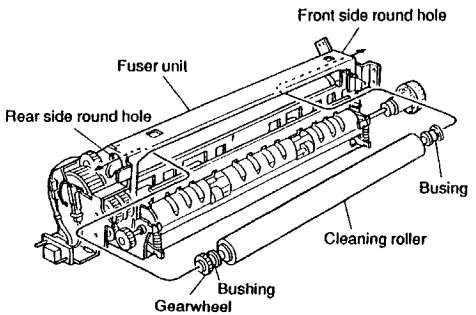
② Remove the CL spring which is fixed to the front side of the fuser unit with fixing tape. At that time, carefully remove the fixing tape.

Then remove the CL holding plate screw (1 pc.) in the rear side of the fuser unit, and remove the CL holding plate.

The removed CL holding plate and the fixing screw will be used again.



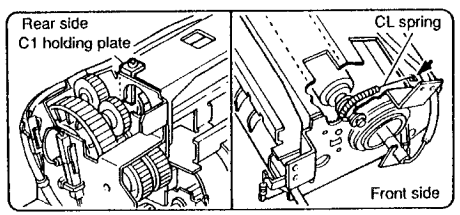
③ Route the cleaning roller gearwheel through the round hole in the rear side of the fuser unit and insert the cleaning roller into the round hole on the front side. Note the bushings at both ends of the cleaning roller. Fit the bushings into the appropriate slots in the fuser unit frame.



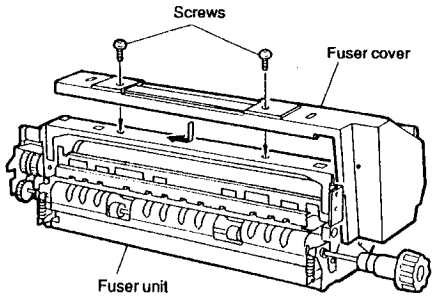
④ Hang the CI spring on the fuser unit frame. (See the arrow ← in the figure)

Attach the CI holding plate to the original position and fix with the fixing screw.

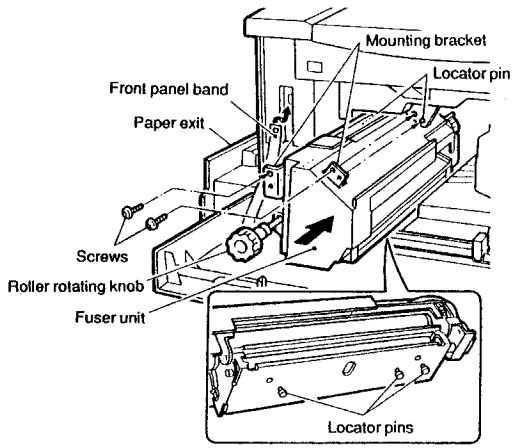
Check that the CL spring and the CI holding plate are holding the bearing section as shown in the figure.



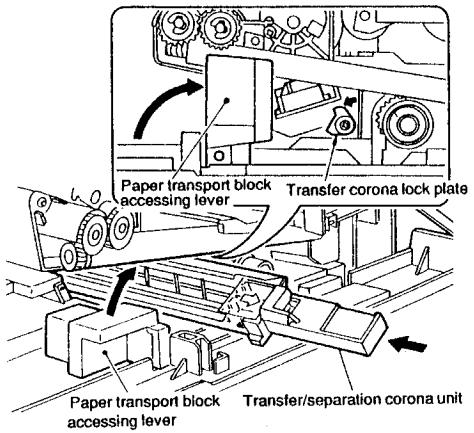
⑤ Replace the fuser cover removed in Step 1, and fasten it with two screws.



⑥ Insert the locator pin under the fuser unit into slot. Gently push fuser unit all the way in.
Make sure now that the locator pins of the copier are firmly engaged into two locator holes of the fuser unit mounting bracket.
Secure fuser unit with two screw removed in ② of **A**, and close the paper exit.
Replace the front panel band that removed in ① of **A**.
Close the paper exit cover.

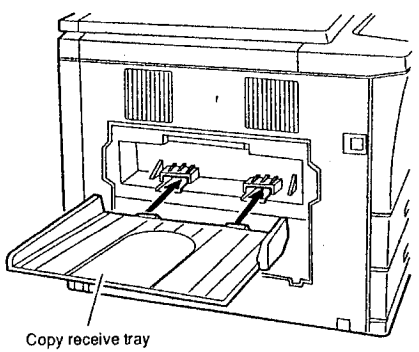


④ Install the separation corona guide to the corona housing. Insert the corona assembly along the guide of the transfer/separation corona unit. Rotate the transfer corona lock plate counterclockwise, return the paper transport block accessing lever clockwise, and close the front panel.


Paper transport block accessing lever
Transfer corona lock plate
Paper transport block accessing lever
Transfer/separation corona unit

4. Installing accessories

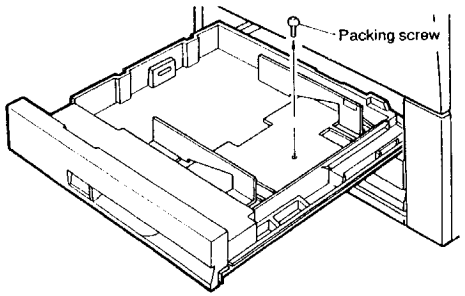
A Install the copy receive tray



5. Setting up the upper paper tray (lower)

A Remove the packing screw of the tray

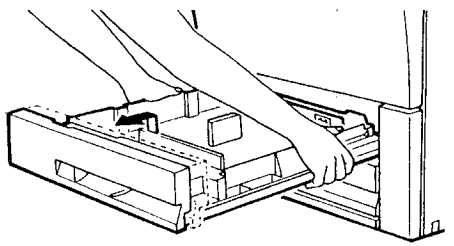
Pull out the tray drawer by lifting while pulling out drawer.
Remove the one packing screw that secures the paper tension plate of the tray.



When shipping, the upper tray is set to A4 size. (Lower: A3)

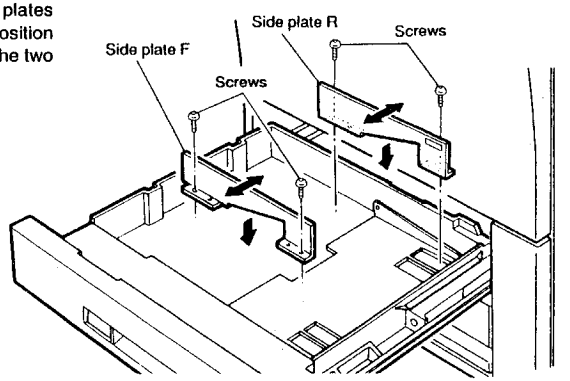
B Removing the tray

Hold up the tray grasping the both sides of the tray and pull it all the way out.



C Change the size using the side plates F and R.

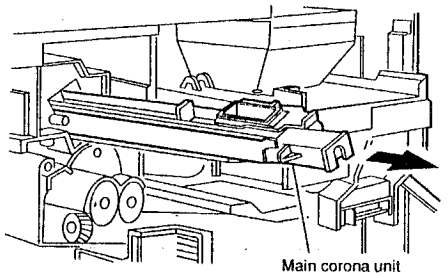
Remove two screws that hold the side plates F and R. Set the plates into their position shown with notches, and secure with the two screws.



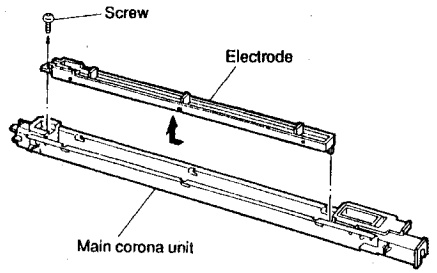
3. Cleaning corona unit

A Clean the main corona unit

① Push down the hook of the main corona unit while removing the main corona unit from the copier.



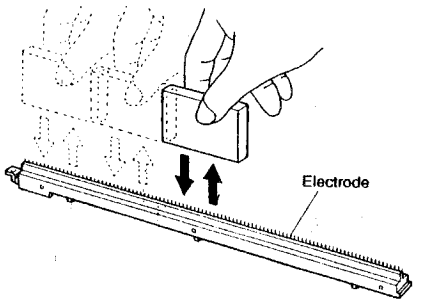
② Unfasten the one screw holding the electrode on the back of the main corona unit and remove the electrode.



③ Very carefully clean the top of the electrode using the cleaner. Repeat this procedure a few times.
The saw-teeth should be cleaned with foam polystyrene as shown in the figure.

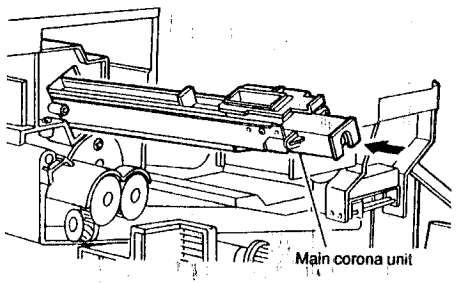
NOTES:

- Never move the cleaner in any direction except up and down when the cleaner is in contact with the electrode..
- Be sure to clean away the whole area evenly. Never clean only a portion of the electrode.



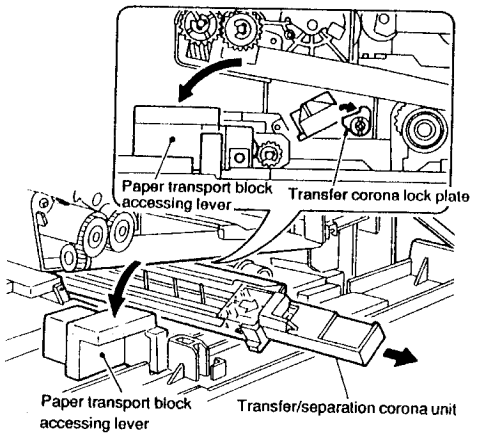
④ Install the electrode and secure it with the one screw.

⑤ Insert the main corona unit all the way into machine. Guides must be inserted into proper slots.

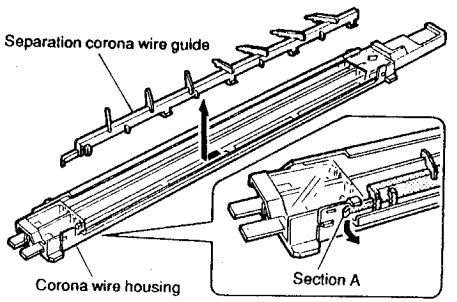


B Clean the transfer/separation corona wires

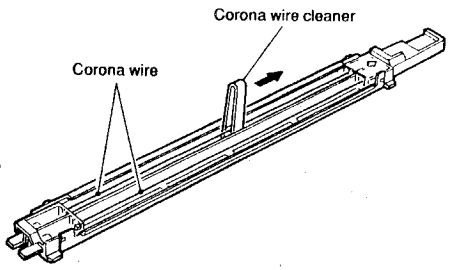
① Tilt the paper transport block accessing lever to left. Rotate the transfer corona lock plate clockwise using the scale or flat tip screwdriver to release it from the lock. Remove the transfer/separation corona unit from the copier.


Paper transport block accessing lever
Transfer corona lock plate
Paper transport block accessing lever
Transfer/separation corona unit

② Unhook the section A of the separation corona guide, slide the separation corona in the direction of the arrow, and remove the separation corona guide from the corona housing.

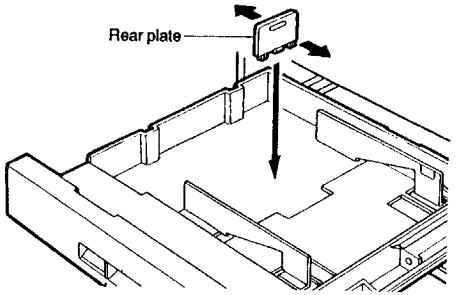


③ Squeeze the transfer/corona wire with the corona wire cleaner. Move the cleaner in the direction of the arrow to clean the wire.



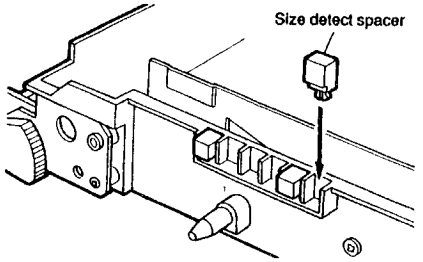
D Insert the rear plate

Remove the rear plate and set the plate into the position indicated for the desired paper sixe.



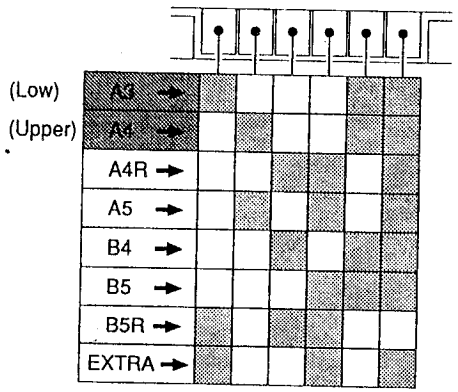
E Set the size detect spacer

Change the position of the size detect spacer. Move the spacer to the appropriate positions.

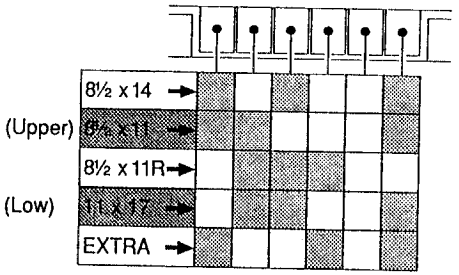


(Ex) A3 setting

AB system



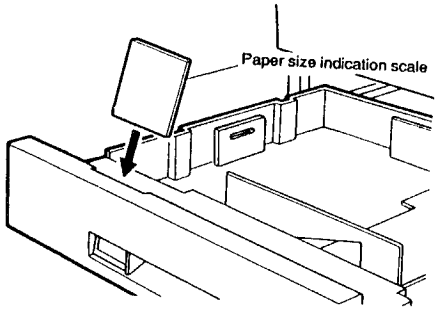
Inch system



F Change the paper size indication plate

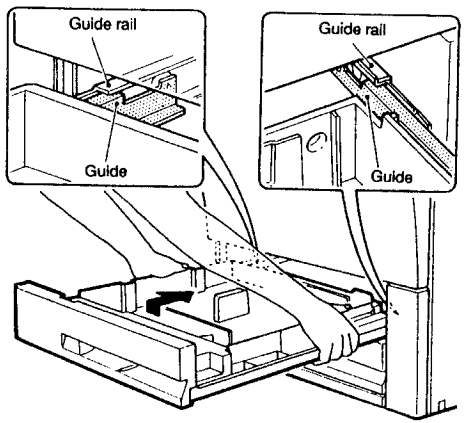
Remove the paper size indication plate. Install the plate so the size of the paper can be seen from the window.

Paper sizes are printed on the front and the back of the paper size indicator plate.



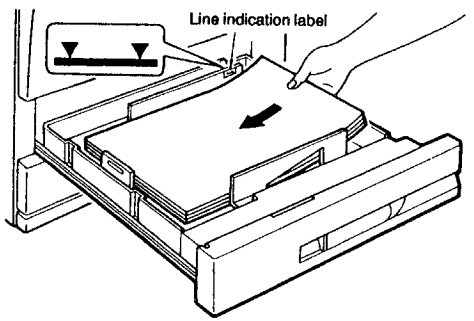
G Set the tray

Hold up both sides of the tray from back and insert it along the guide rails. Ensure the tray moves in and out smoothly.



H Load paper

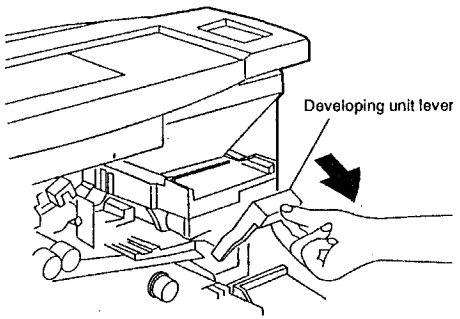
Load paper in the tray, but not above the maximum line.
Insert the tray all the way into the machine.



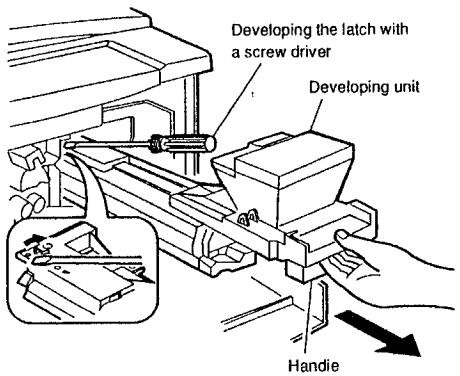
6. Setting developing unit

A Remove the developing unit

① Open the front panel and pull the developing unit lever forward.

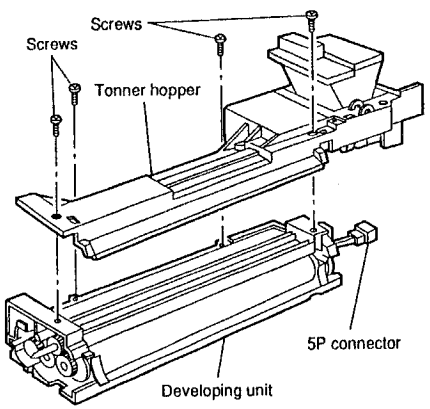


② Hold the handle of the developing unit and gently pull the developer unit out until it stops. Lift the carrying strap of the developing unit, disengage the latch (stopper) with a screwdriver, and remove it.

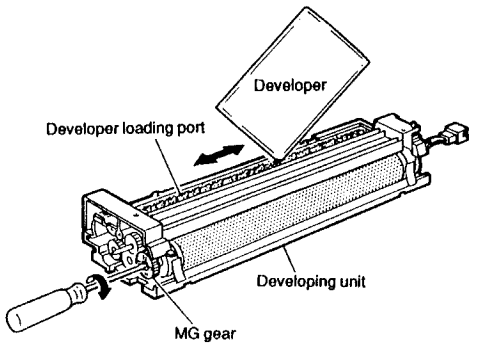


B Load developer

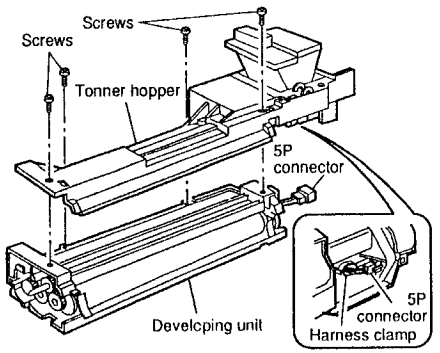
① Unfasten the 5P connector that connect the toner hopper with the developing unit. Remove four screws that hold the toner hopper on the developing unit, then remove the toner hopper.



② Pour in the developer in the developer loading port of the developing unit, while rotating the MG gear clockwise with the Phillips screwdriver. Pour in one bag of developer into the developing unit.

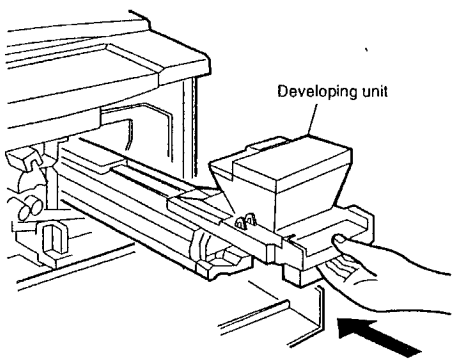


③ Install the toner hopper using the four screws that hold the toner hopper to the developing unit and connect the 5P connector between the toner hopper and the developing unit. Note, the harness of the 5P connector must be inserted into the harness clamp.



C Set the developing unit to the copier

Place the developing unit in the copier. Insert the developer unit all the way in, close the developing unit lever and the front panel.

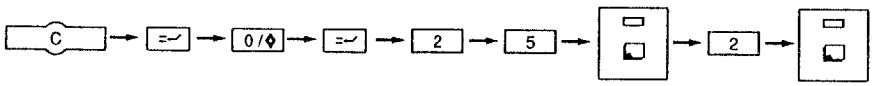


7. Adjust the toner density referance level

Turn the copier power on.

A Adjust the toner density referance level of the developing tank

① Execute the test command 25 sub 2.



② In two minutes, the test will complete.

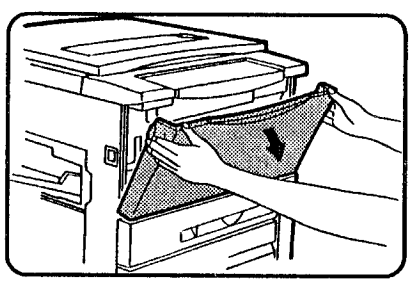
NOTE: Never try to cancel this test command execution. Otherwise, the automatic developer referance adjustment can not be acheived.

③ Exit test command mode.

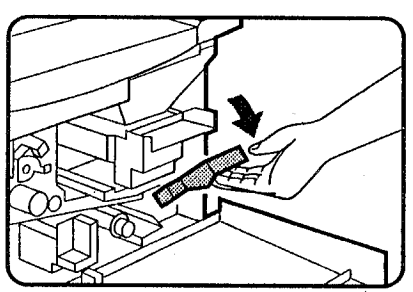
8. Loading toner

The toner required ( ) indicator will light when toner is needed. If copying is continued while the indicator is lit, copies will gradually become lighter until the Copier stops and the indicator blinks. The indicator may also begin blinking during long copy runs of multiple dark originals even through toner is left. If the indicator begins to blink, the Copier will stop making copies. Open and close the front cover. When sufficient toner has been fed, the indicator will go out and the READY ( ) indicator will light green. Press the PRINT ( ) button to resume copying.

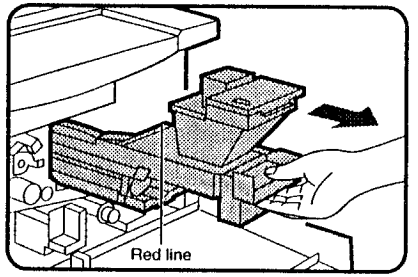
① Open the front cover.



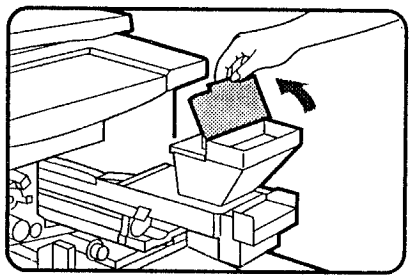
② Pull down the developer unit lock lever.



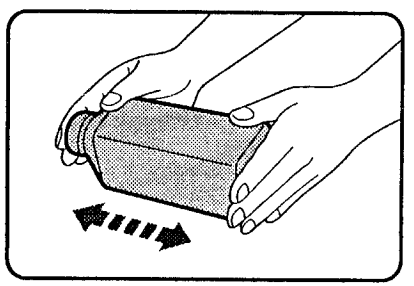
③ Pull the developer unit out slowly.
- Pull the developer unit out until you can see the red line when looking from directly above.



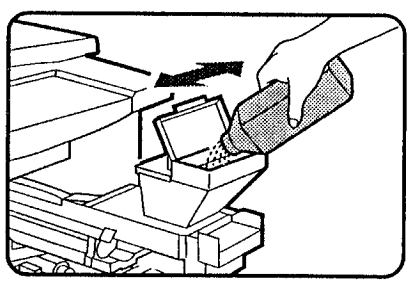
④ Open the toner hopper lid.



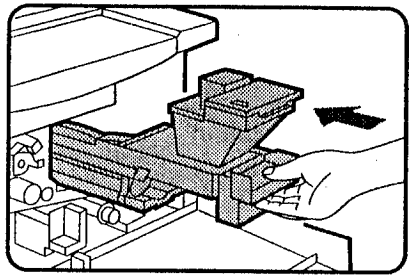
⑤ Shake the toner bottle well five or six times.



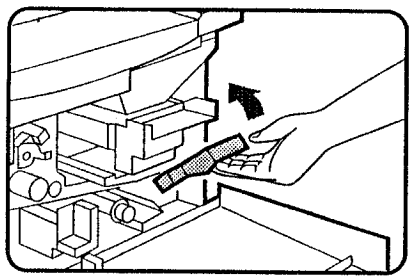
⑥ Pour the toner slowly and evenly into the toner hopper.
- Add only one bottle of toner.



⑦ Close the toner hopper lid and slide the developer unit into the Copier.



⑧ Turn the developer unit lock lever back into place and close the front cover.

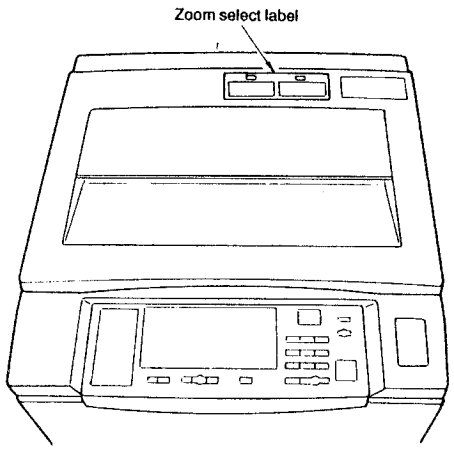


9. Attaching zoom select label

A Bond the label

The zoom select label that comes with Instruction Manual can be installed as shown

●To attach the label on the copier with the original cover



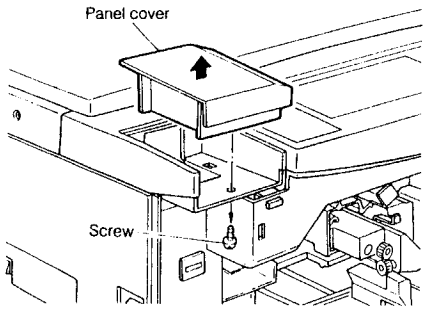
10. Install the options

First, turn the copier power off, then do the following.

(SF-EA11, EA12)

1 Removing the panel cover.

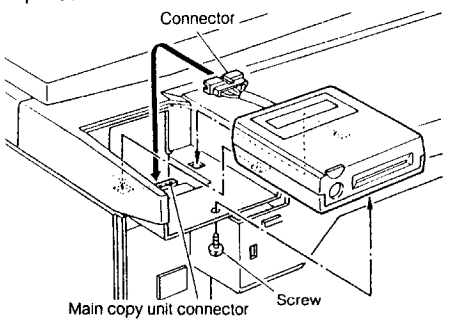
Open the copier front panel.
Remove the one screw under the front panel, and remove the panel cover.



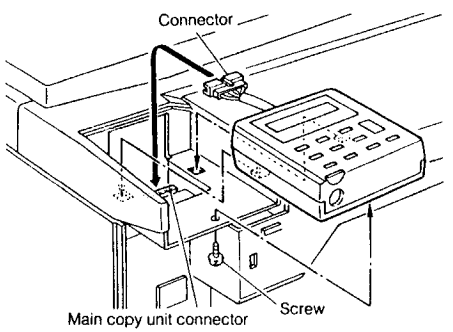
2 Connecting the counter connector

Fasten the counter connector with the copier connector.
Push in the mated connectors into the chest and push in two tabs under the counter bottom, then secure it with one screw removed at Step 1 above.
After the unit has been placed in its place, close the front panel.

[SF-EA11]



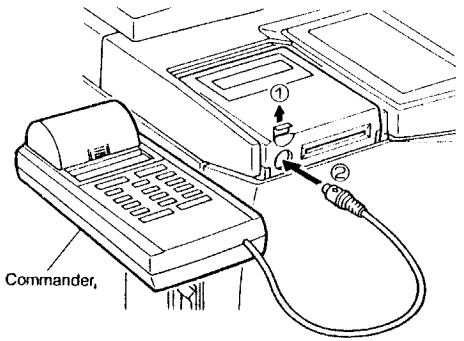
[SF-EA12]



3 Connecting the counter commander

Open the counter interface port and plug in the counter commander cable. Next, turn the power on.

- After the copier has been warmed up, the message "INPUT A PROGRAM NUMBER. P□□" is displayed.



4 Setting the diagnostic mode

Press the [C], [P], [0], and [P] keys on the counter commander keypad. With this, "INPUT SIMULATION No. □□" is displayed and it goes into the diagnostic mode.

5 Setting date

Press the [1] key followed by the [ENTER] key.

The message "TIME/DATE
1. ENTER 2. DISP." is now displayed.

Now, press the [1] key followed by the [ENTER] key.

The message "YEAR □□□□
MONTH □□ " is displayed.

Enter the four digits of a year on the keypad and press the [ENTER] key, followed by one to two digits of a month on the keypad and press the [ENTER] key.

➡ "DATE □□
TIME □□ : □□ " is now displayed.

In the same manner enter the day, hours, and minutes, then press the [ENTER] key. With this, the clock starts counting and it returns to the diagnostic mode screen.
If [2] is pressed, the current date will be displayed.
values in memory are cleared.)

6 Initializing the internal data. (The current

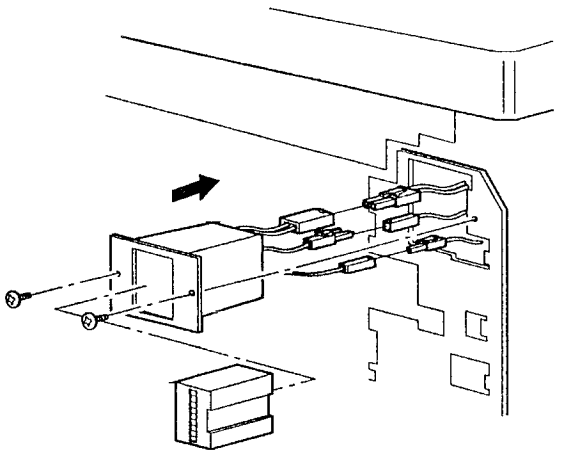
Press the [7] key followed by the [ENTER] key. With this, "INITIAL DATA" is displayed. If the [ENTER] key is pressed in succession, it will return to the diagnostic mode.

7 Removing the counter commander

Unfasten the counter commander interfacing cable and close the port.

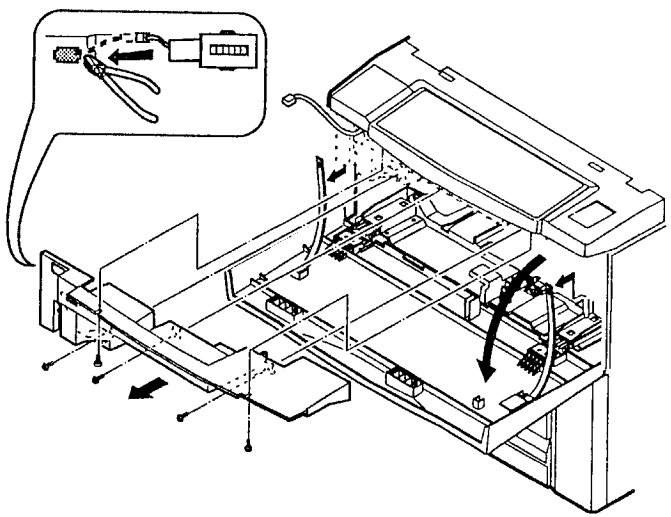
(SF-71A/B)

1 Removing the right cabnet



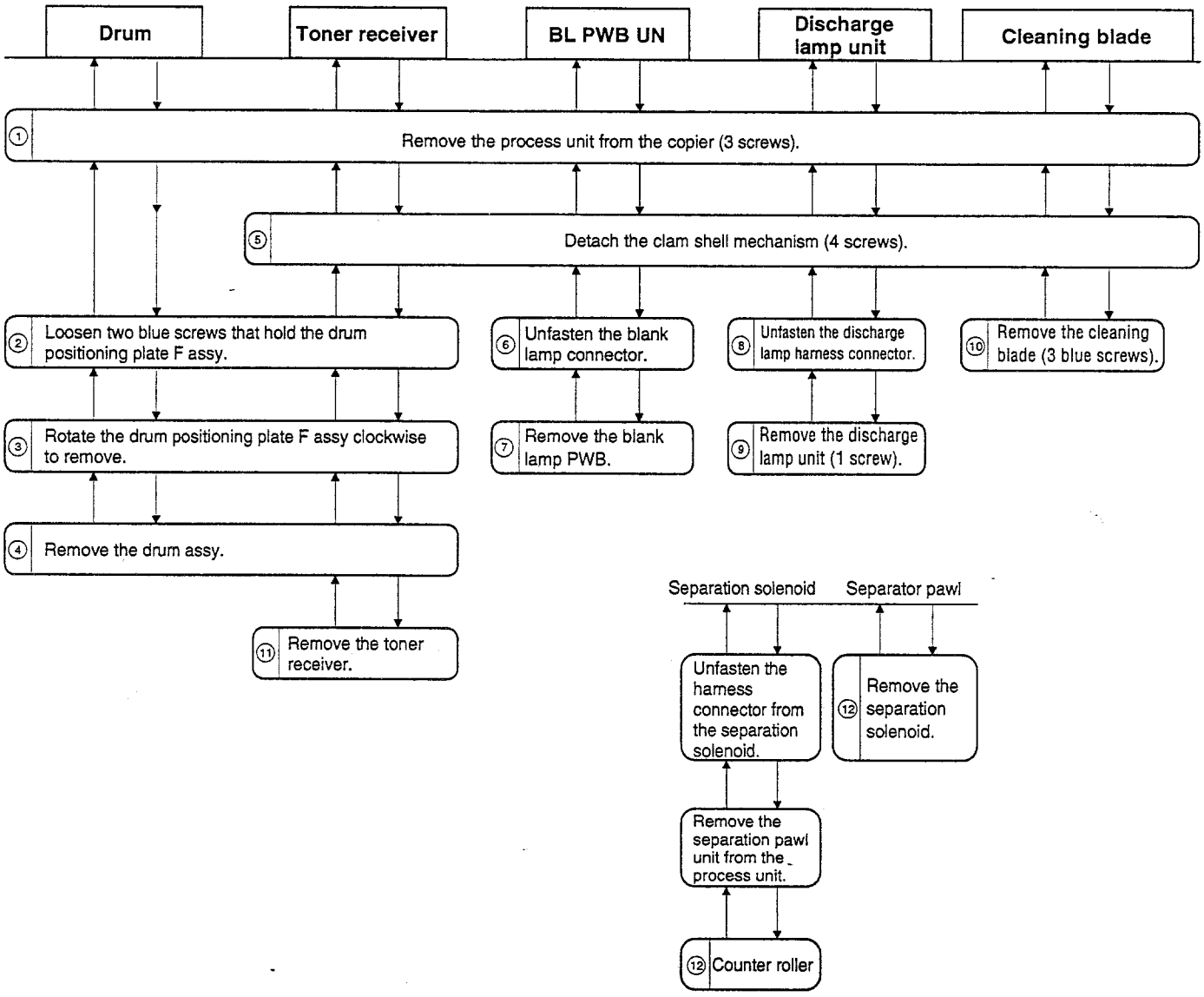
(Mechanical counter)

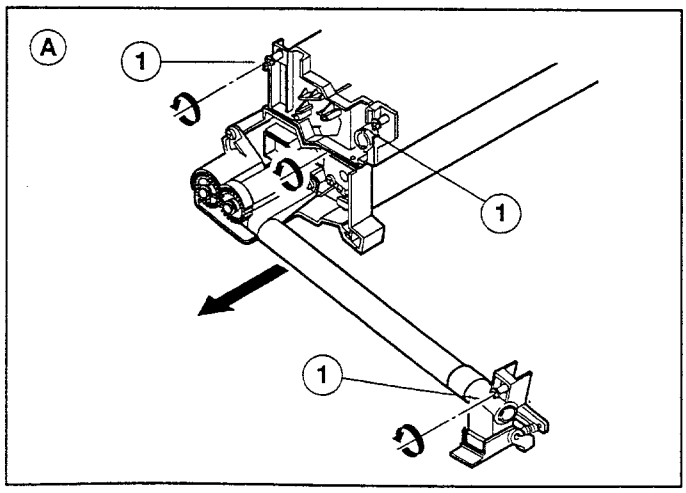
1 Removing the middle panel

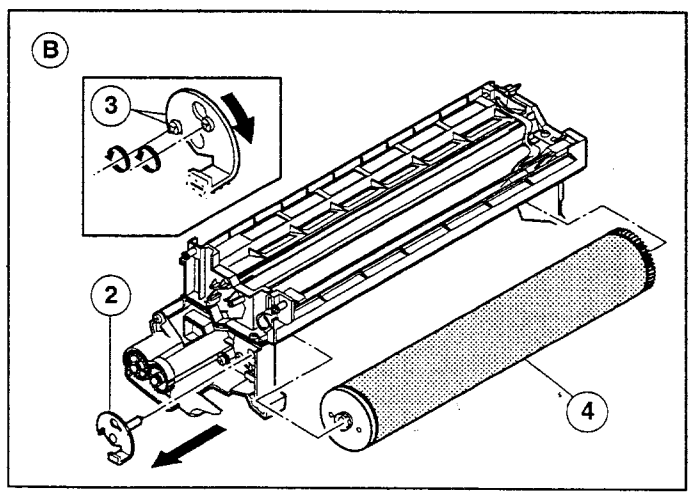


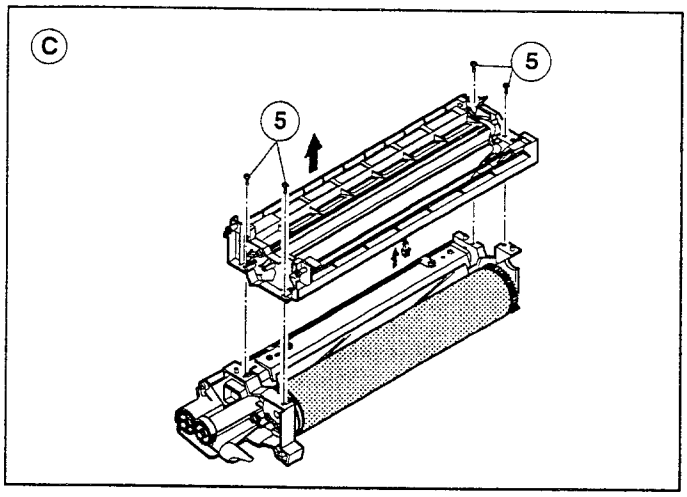
[5] DISASSEMBLY AND REASSEMBLY

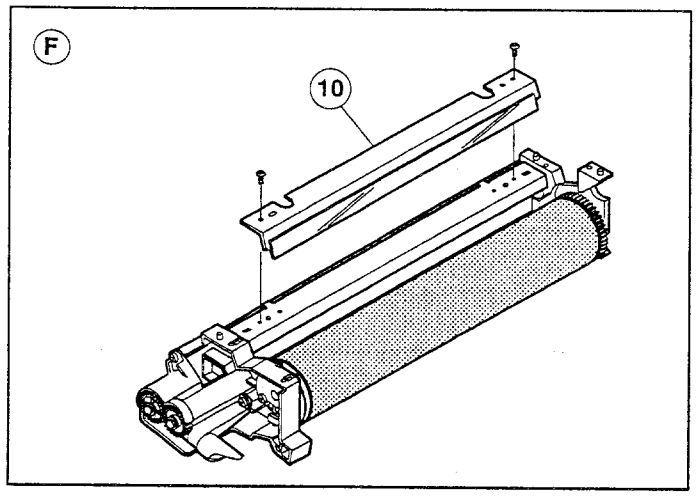
1. Process unit


Drum
Toner receiver
BL PWB UN
Discharge lamp unit
Cleaning blade
① Remove the process unit from the copier (3 screws).
⑤ Detach the clam shell mechanism (4 screws).
② Loosen two blue screws that hold the drum positioning plate F assy.
③ Rotate the drum positioning plate F assy clockwise to remove.
④ Remove the drum assy.
⑪ Remove the toner receiver.
⑥ Unfasten the blank lamp connector.
⑦ Remove the blank lamp PWB.
⑧ Unfasten the discharge lamp harness connector.
⑨ Remove the discharge lamp unit (1 screw).
⑩ Remove the cleaning blade (3 blue screws).
Separation solenoid
Separator pawl
Unfasten the harness connector from the separation solenoid.
⑫ Remove the separation solenoid.
Remove the separation pawl unit from the process unit.
⑫ Counter roller






C
5
5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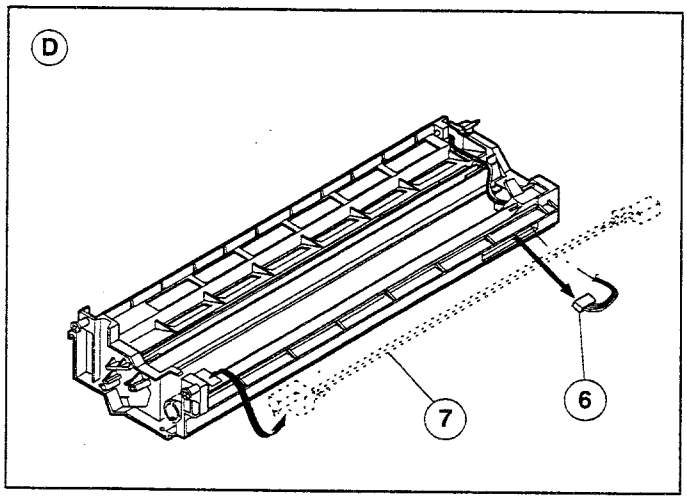
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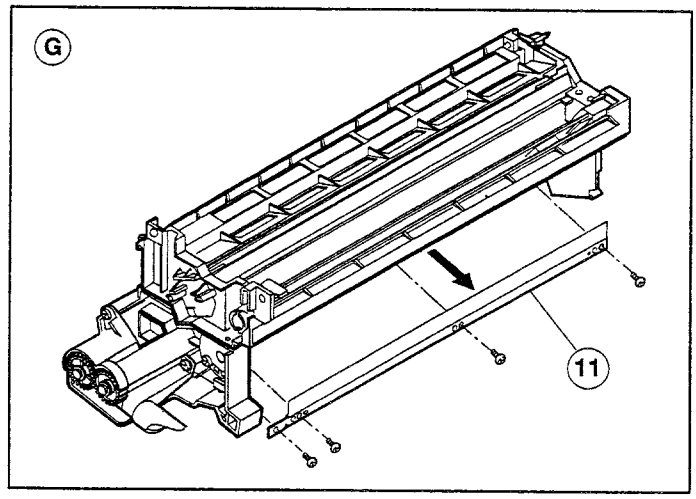
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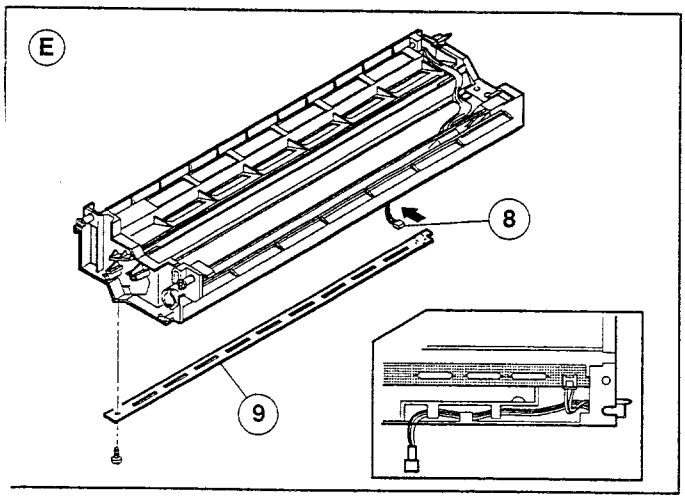
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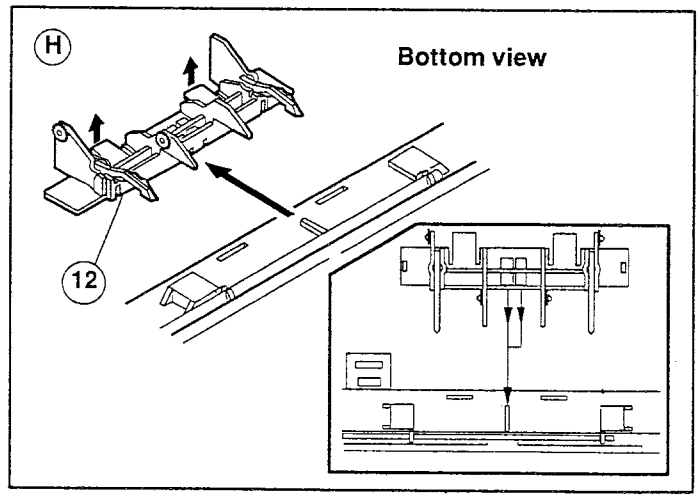
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Bottom view
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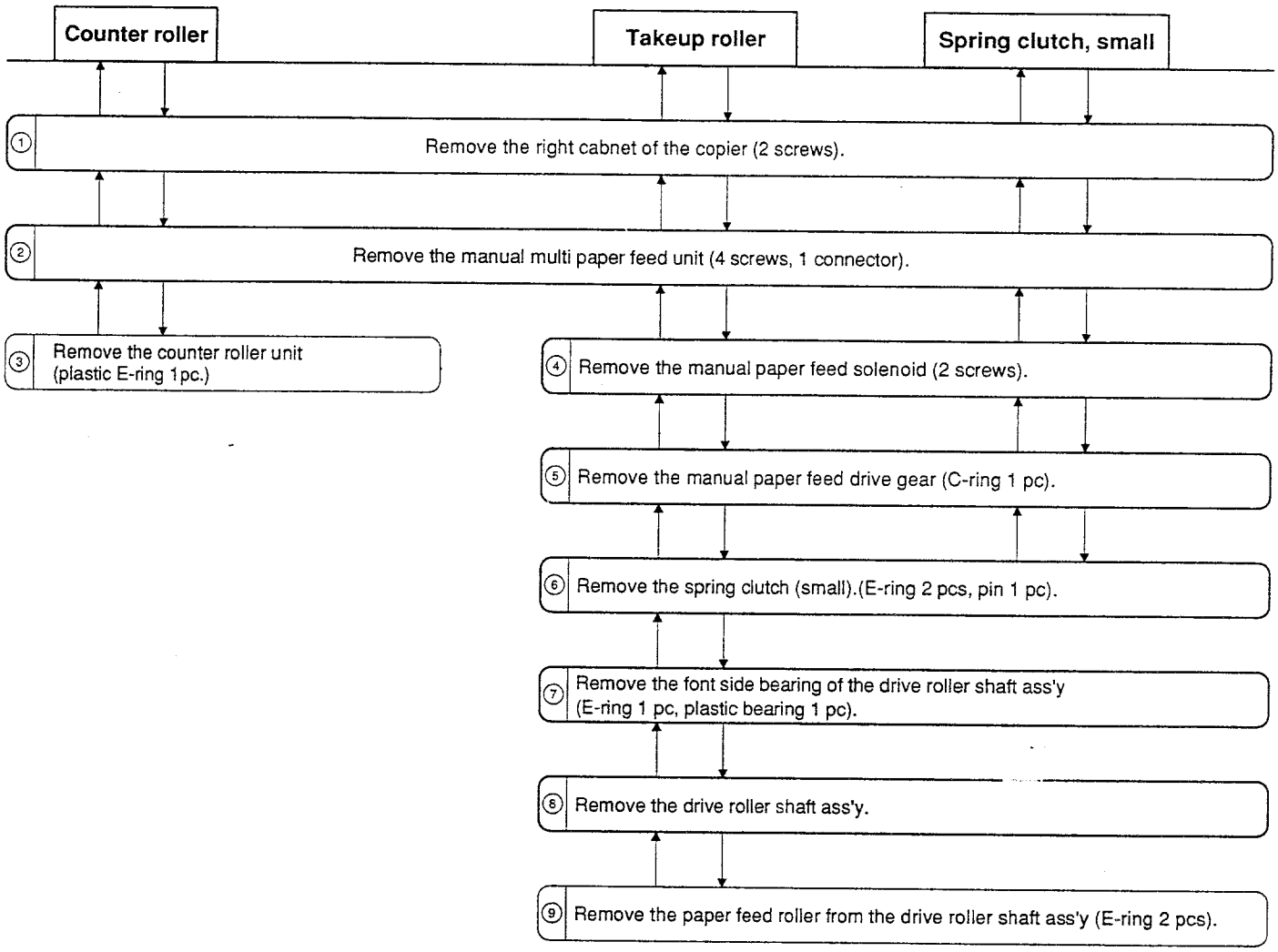
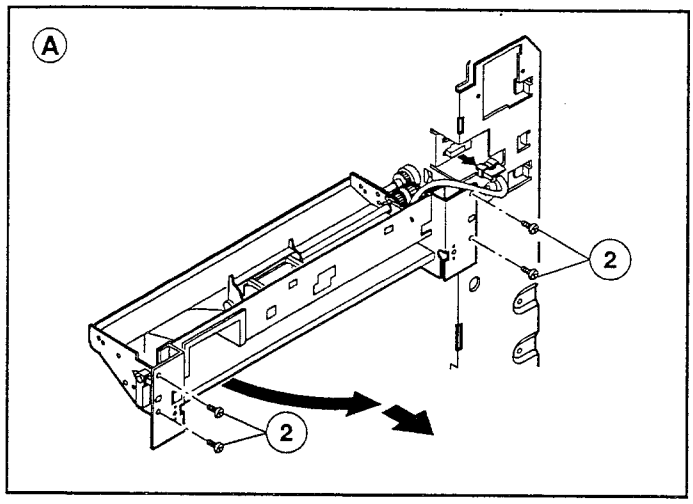
2. Manual paper feed unit


Counter roller
Takeup roller
Spring clutch, small
① Remove the right cabnet of the copier (2 screws).
② Remove the manual multi paper feed unit (4 screws, 1 connector).
③ Remove the counter roller unit (plastic E-ring 1pc.)
④ Remove the manual paper feed solenoid (2 screws).
⑤ Remove the manual paper feed drive gear (C-ring 1 pc).
⑥ Remove the spring clutch (small).(E-ring 2 pcs, pin 1 pc).
⑦ Remove the font side bearing of the drive roller shaft ass'y (E-ring 1 pc, plastic bearing 1 pc).
⑧ Remove the drive roller shaft ass'y.
⑨ Remove the paper feed roller from the drive roller shaft ass'y (E-ring 2 pcs).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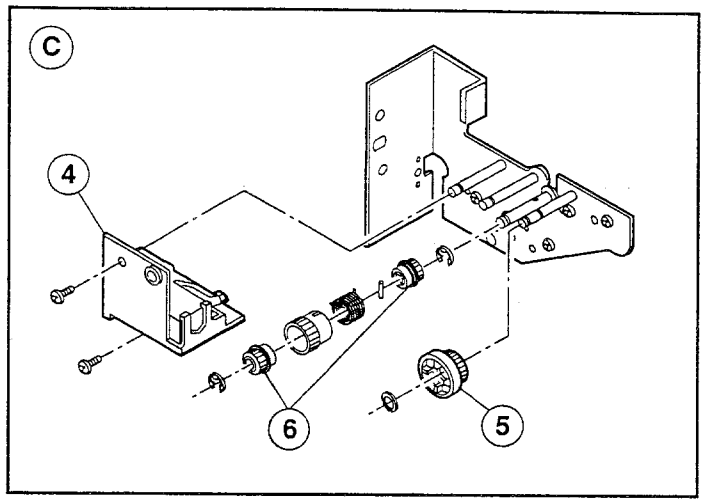
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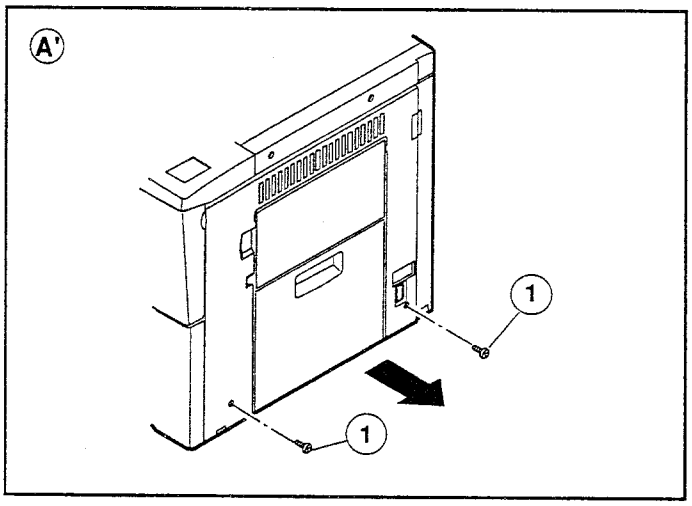
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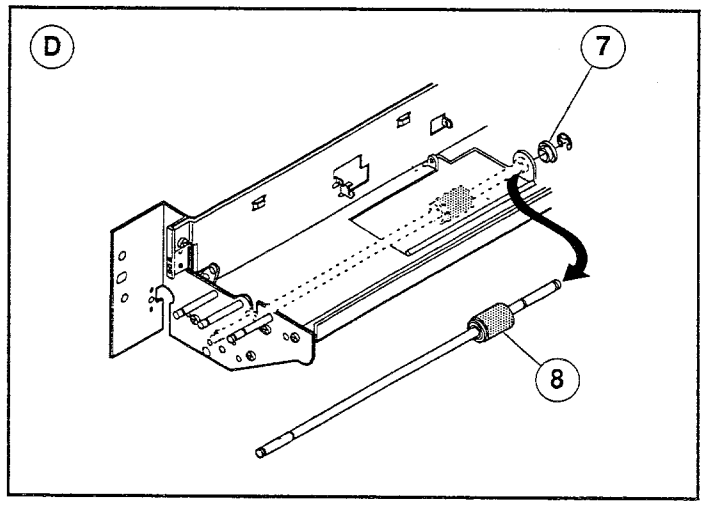
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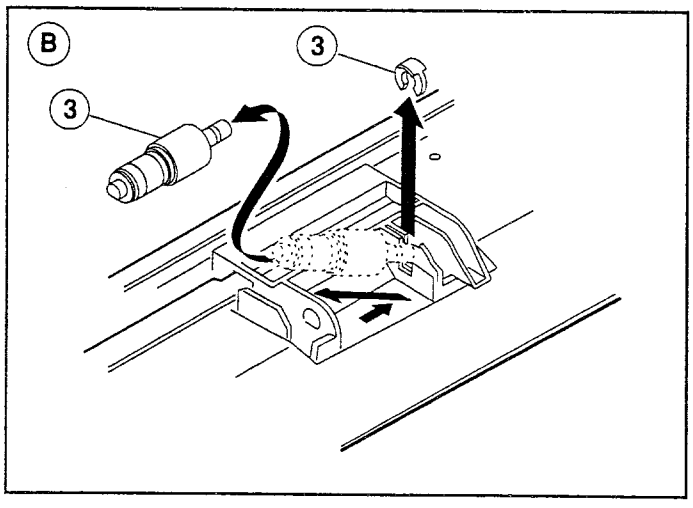
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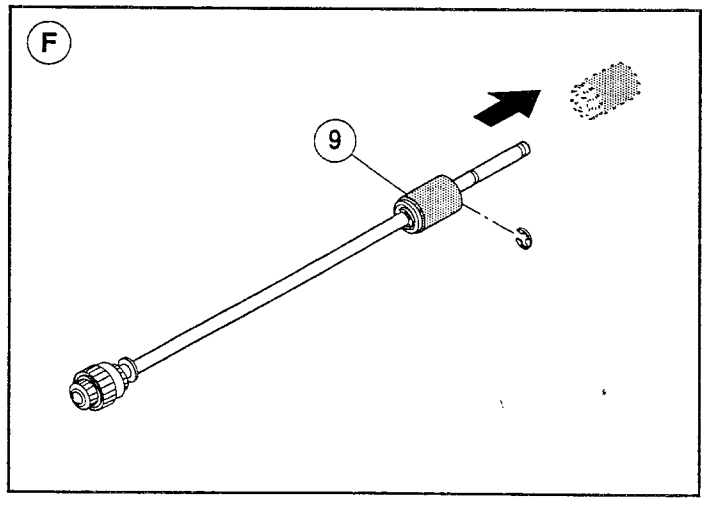
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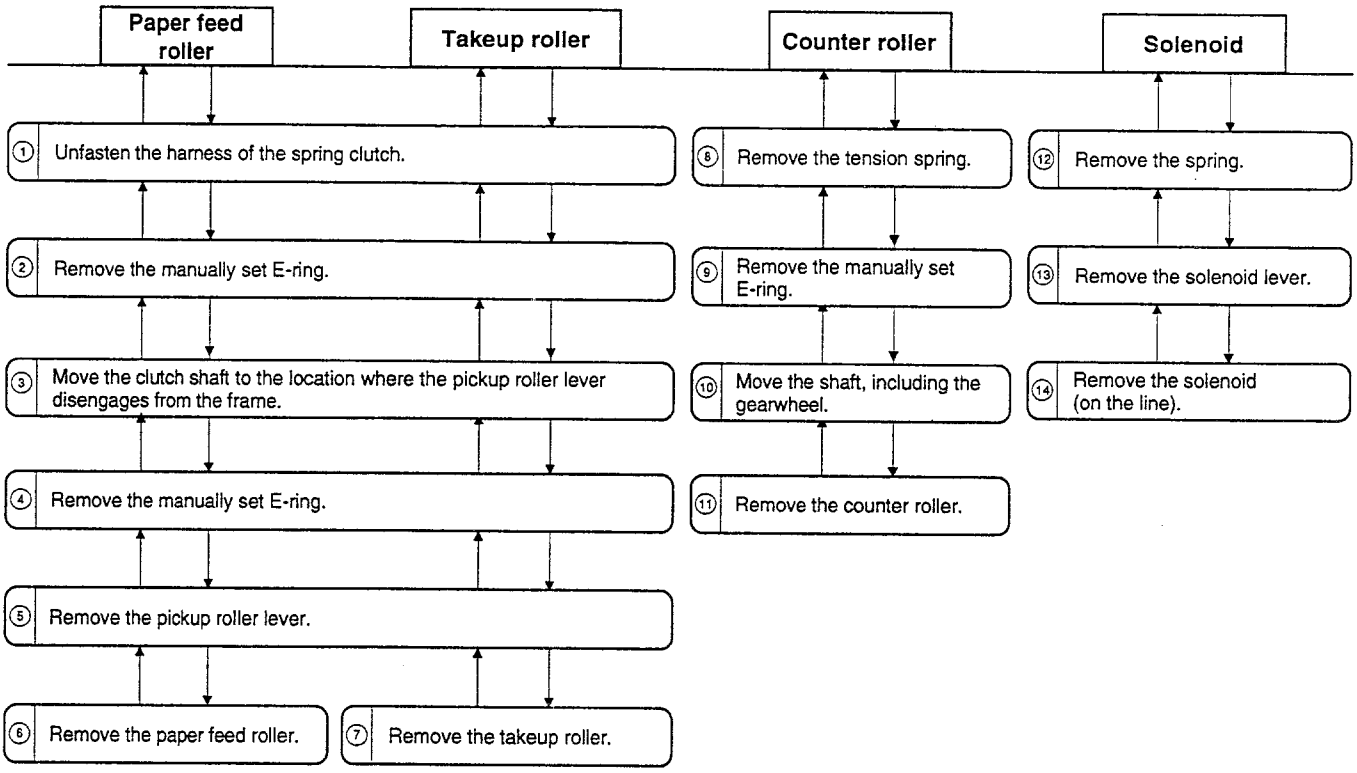
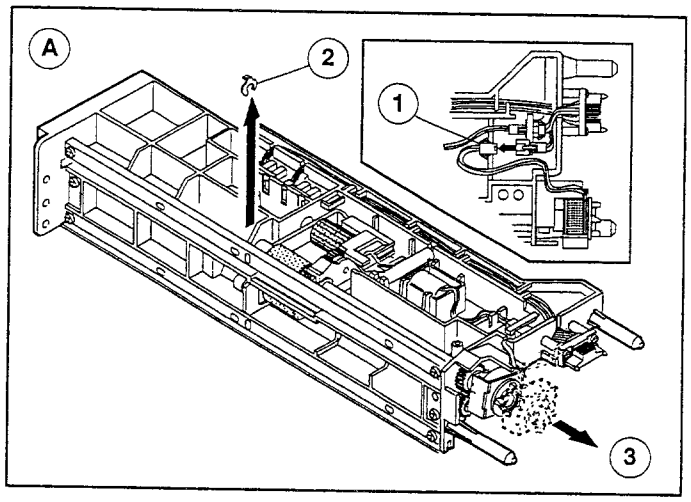
3. Paper feed unit


Paper feed roller
Takeup roller
Counter roller
Solenoid
① Unfasten the harness of the spring clutch.
② Remove the manually set E-ring.
③ Move the clutch shaft to the location where the pickup roller lever disengages from the frame.
④ Remove the manually set E-ring.
⑤ Remove the pickup roller lever.
⑥ Remove the paper feed roller.
⑦ Remove the takeup roller.
⑧ Remove the tension spring.
⑨ Remove the manually set E-ring.
⑩ Move the shaft, including the gearwheel.
⑪ Remove the counter roller.
⑫ Remove the spring.
⑬ Remove the solenoid lever.
⑭ Remove the solenoid (on the line).

NOTE: The one-way clutch is on the rear frame side (clutch side).

NOTE: The side with a protrusion is on the rear side.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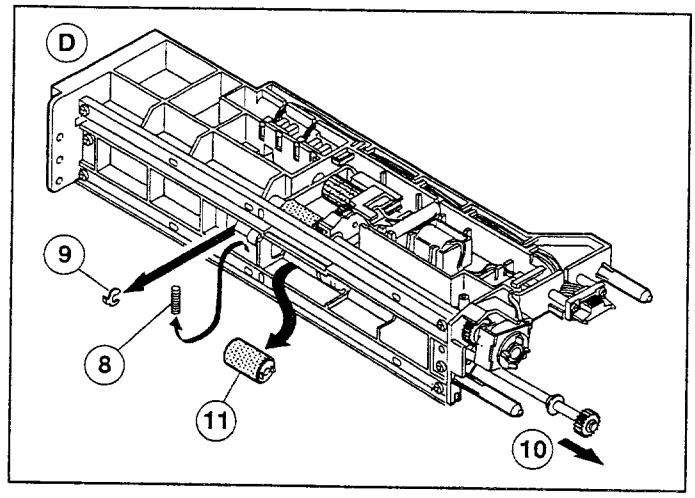
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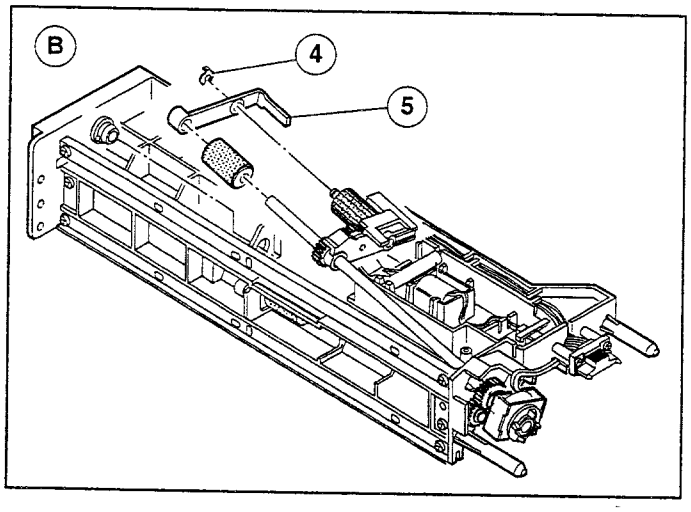
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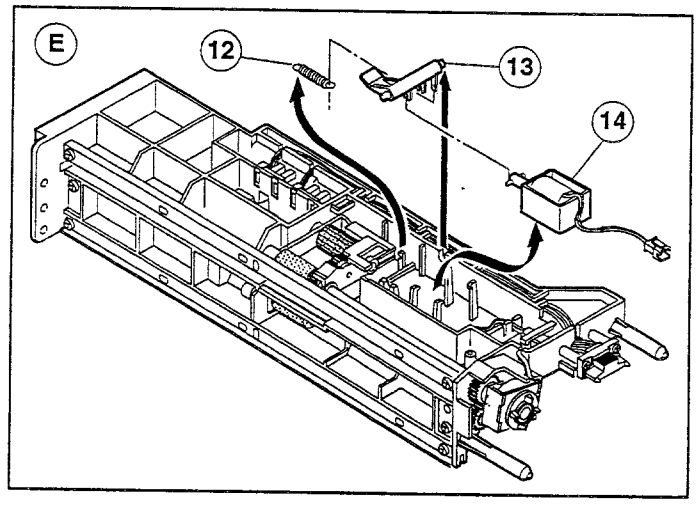
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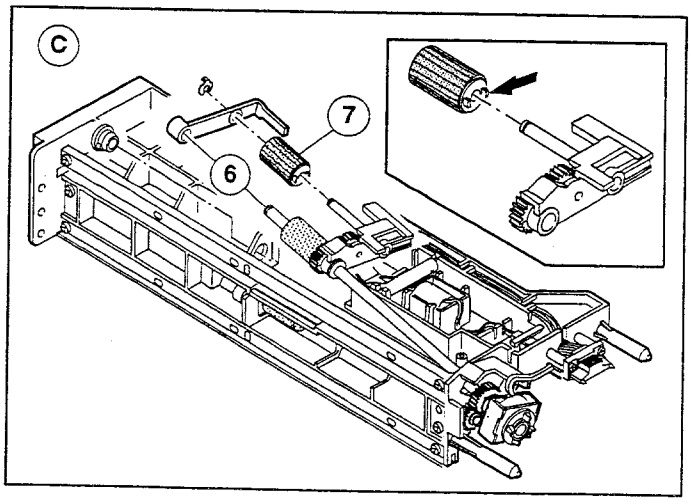
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4. Transport baseplate unit

Suction unit transfer belt | **Paper stop roller** | **Paper stop clutch**

① Remove the transport baseplate from the machine (4 screw on front, 2 on rear, 2 connectors).

② Pull the paper entry side rolle towards the paper exit side, then remove it.

③ Move the suction transfer belt to the front side, then remove it.

NOTE: Note the arrowhead that shown on the suction unit transfer belt.

④ Remove the DV guide (6 screws).

⑤ Remove the spring and the auxiliary roller.

⑥ Remove the paper stop clutch (1 screw, and loosen 1 setscrew).

⑦ Remove the front side gearwheel (one each of E-ring, pin, washer, spring).

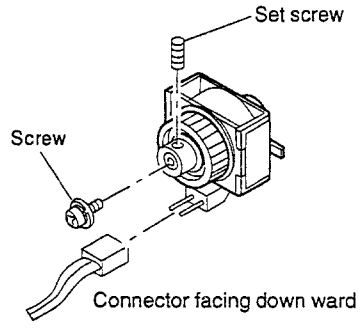
⑧ Remove the bearing (one each on front and rear).

⑨ Remove the paper stop roller.

⑩ Remove the connecting plate ⑤ in Fig. Ⓕ. (2 screws)

⑪ Remove the stopper and the 22T gear.

⑫ Remove the P.S clutch



NOTE: H specificafions mode remove the demoisture heater lamp in the suction section. (Remove heater connector ⓑ in Fig. Ⓑ.)

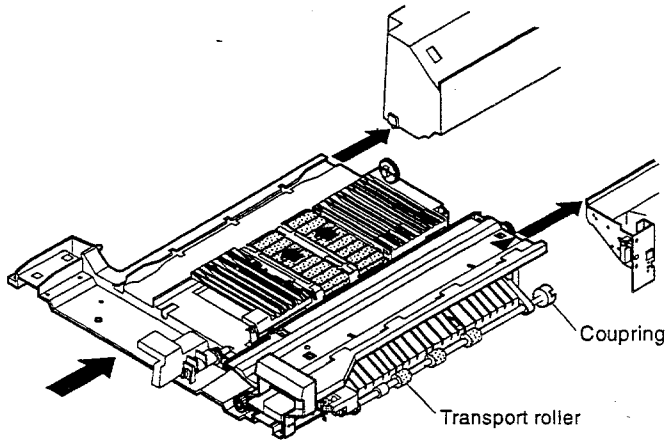
Suction lift lever

Loosen screw ⓐ in Fig. Ⓐ and shift the suction lift lever to R side, and the heater unit will be remove

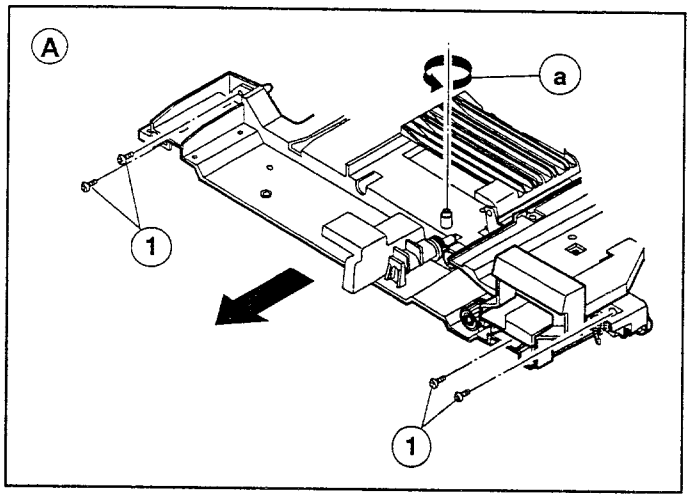
※ When removeing the transport plate unit, remove the DV tank, the front cabinet, the process unit, the upper cassette (ADU unit) in advance.
For removing the upper cassette, it is advisable to remove the paper feed unit in advance.
Since the fuser unit will serve as the guide rail for removing and assembling the transport bace plate, do not remove it.
Open the right cabinet.

※ When installing the transport base plate unit

① Fit the arrow mark in the DV guide with the groove in the left side of the rail transport base plate in the malti paper feed section of the main body and the mark in the fusing unit cover.



② Securely engage the transport roller coupring with the main body coupring. If not, the unit cannot be inserted to the end.
Check that the roller can be turned manually. (If the couprings are not securely engaged, the roller cannot be turned manually.)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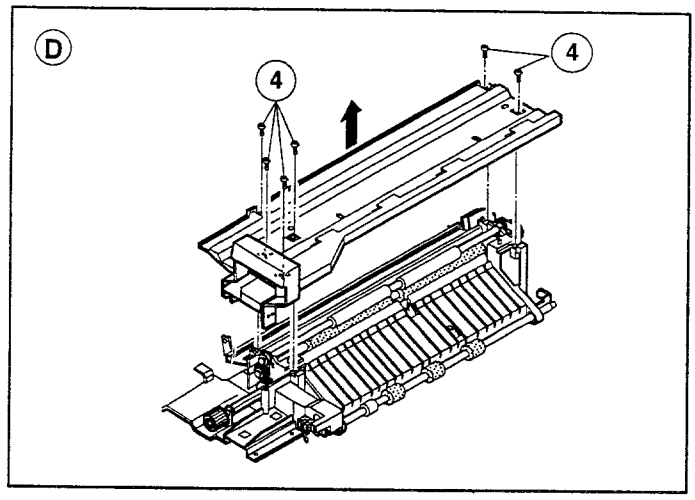
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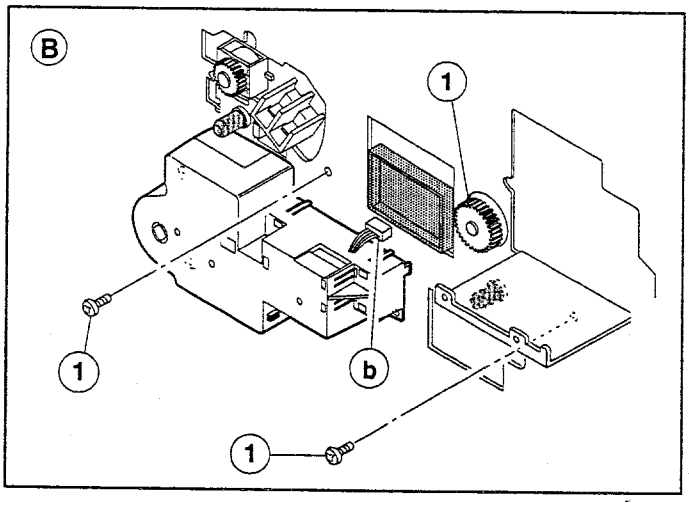
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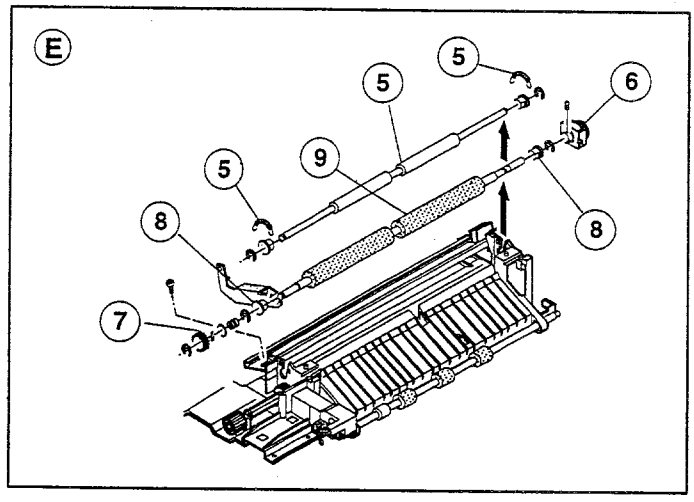
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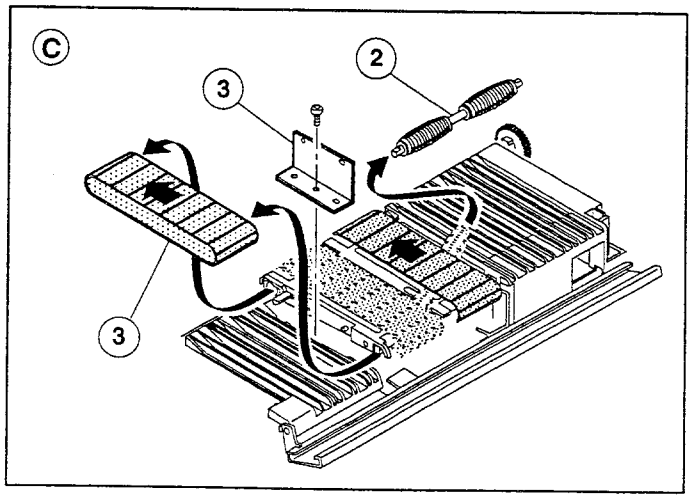
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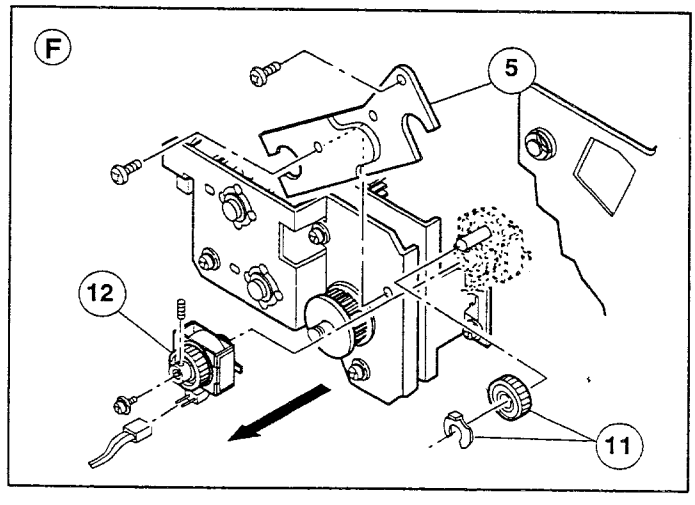
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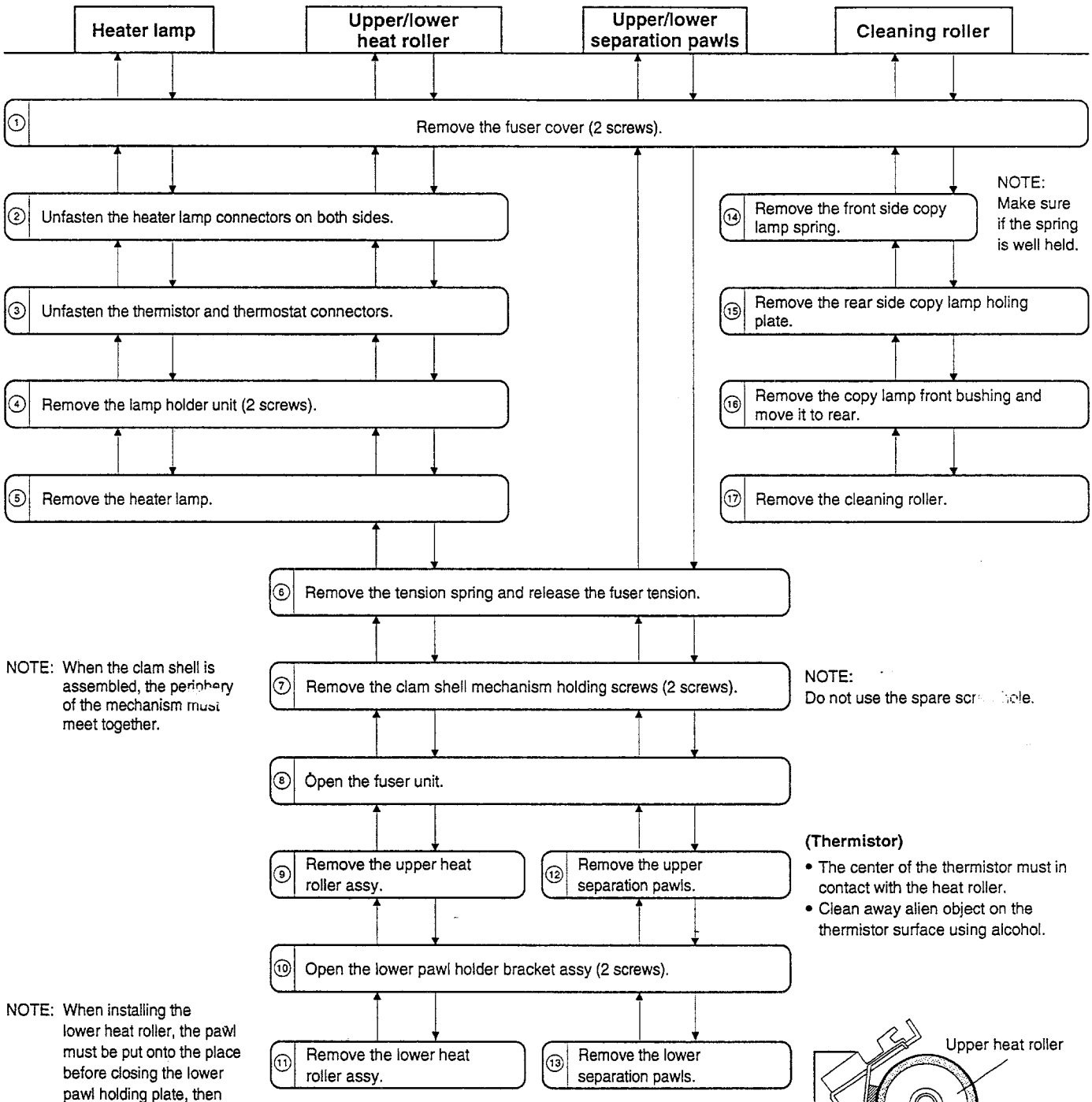
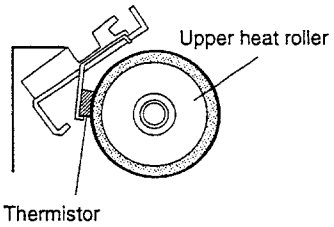
5. Fuser unit


Heater lamp
Upper/lower heat roller
Upper/lower separation pawls
Cleaning roller
① Remove the fuser cover (2 screws).
② Unfasten the heater lamp connectors on both sides.
③ Unfasten the thermistor and thermostat connectors.
④ Remove the lamp holder unit (2 screws).
⑤ Remove the heater lamp.
⑥ Remove the tension spring and release the fuser tension.
⑦ Remove the clam shell mechanism holding screws (2 screws).
⑧ Open the fuser unit.
⑨ Remove the upper heat roller assy.
⑩ Open the lower pawl holder bracket assy (2 screws).
⑪ Remove the lower heat roller assy.
⑫ Remove the upper separation pawls.
⑬ Remove the lower separation pawls.
⑭ Remove the front side copy lamp spring.
⑮ Remove the rear side copy lamp holing plate.
⑯ Remove the copy lamp front bushing and move it to rear.
⑰ Remove the cleaning roller.
NOTE: Make sure if the spring is well held.
NOTE: When the clam shell is assembled, the periphery of the mechanism must meet together.
NOTE: When installing the lower heat roller, the pawl must be put onto the place before closing the lower pawl holding plate, then restore it after closed.

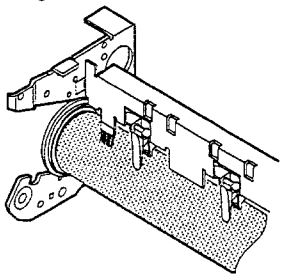
NOTE:
Do not use the spare scr[illegible]ole.

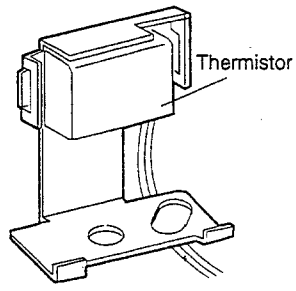
(Thermistor)

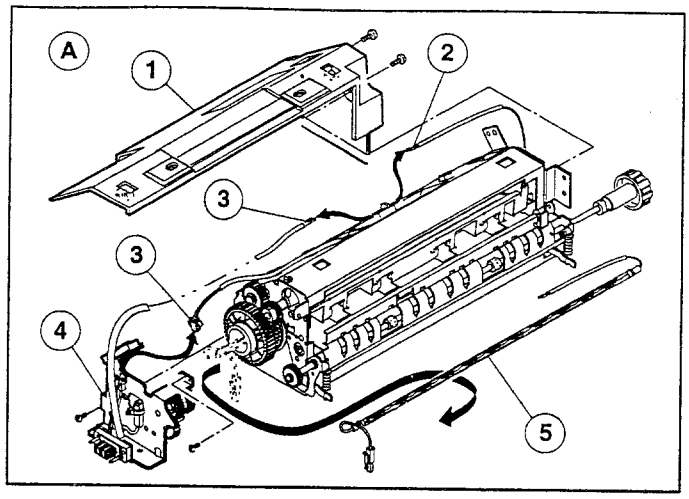
- The center of the thermistor must in contact with the heat roller.
- Clean away alien object on the thermistor surface using alcohol.



Discharge brush
The discharge brush must in contact with the upper heat roller.



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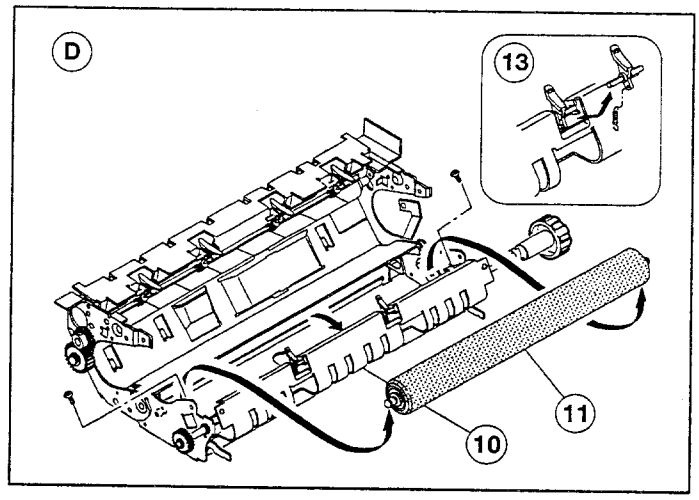
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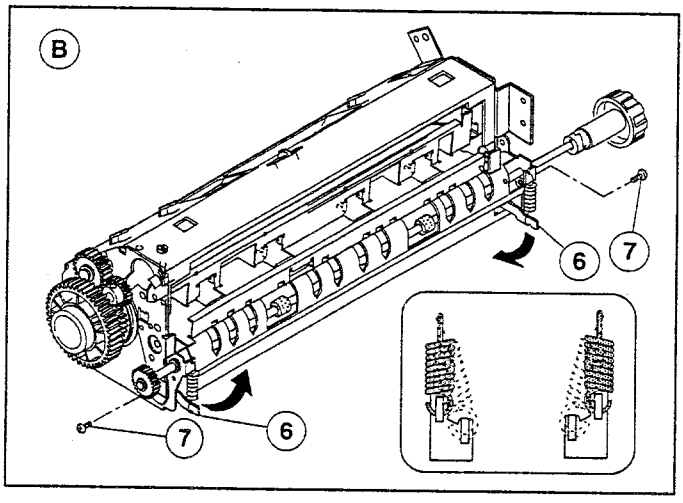
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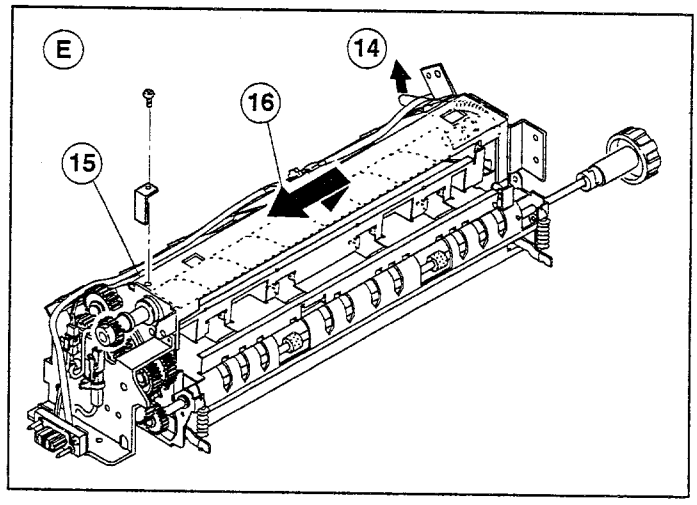
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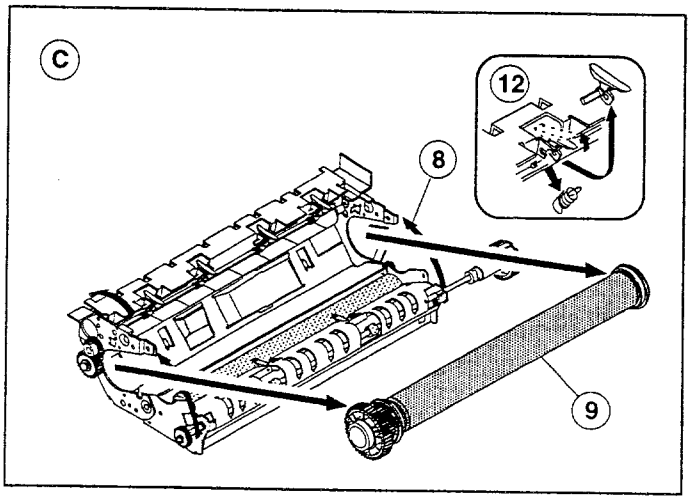
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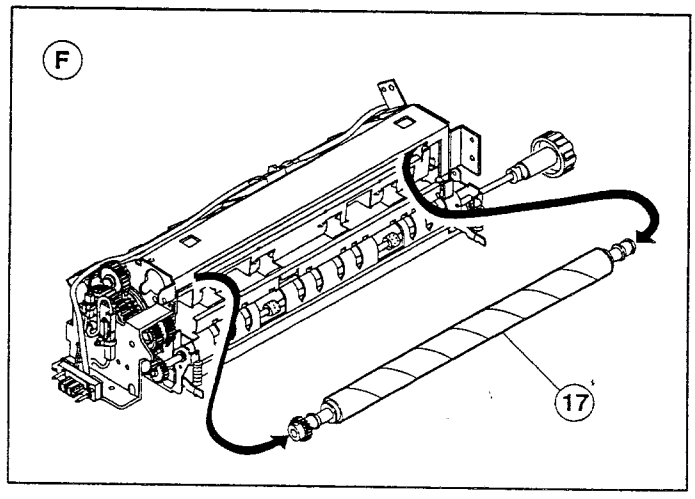
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6. Rear frame side major components

Paper feed drive unit | Paper feed clutch unit | Main drive unit (belt)

① Remove the rear panel (4 screws).

② Remove the main PWB connectors (8 connectors).

③ Remove the main PWB unit from the copier (1 screw).

④ Remove the paper feed drive unit (4 screws).

⑤ Remove the joint plate (2 screws).

⑥ Remove the pulley holding E-ring, in the paper feed unit side then remove the drive belt.

⑦ Remove the paper clutch feed unit (4 screws)

⑧ Remove the clutch connector.

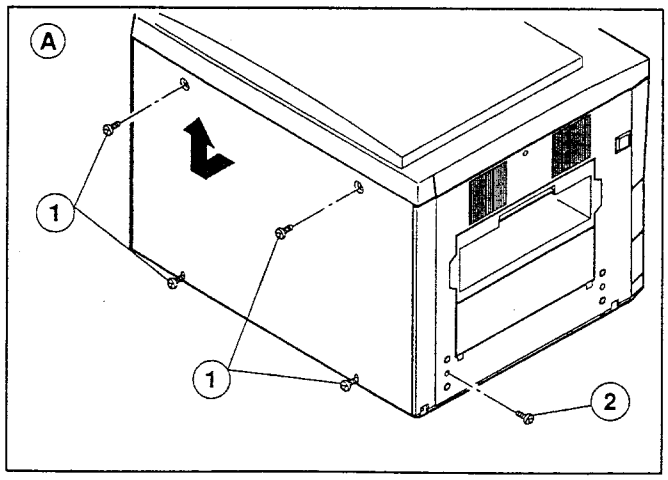
⑨ Unfasten the high voltage unit connectors (6 connectors), and remove the ground harness from the copier chassis (1 screw each).

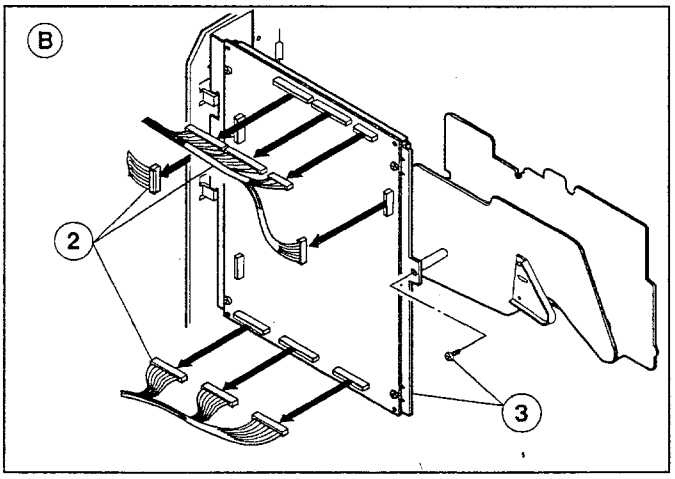
⑩ Remove the high voltage PWB from the suction duct unit.

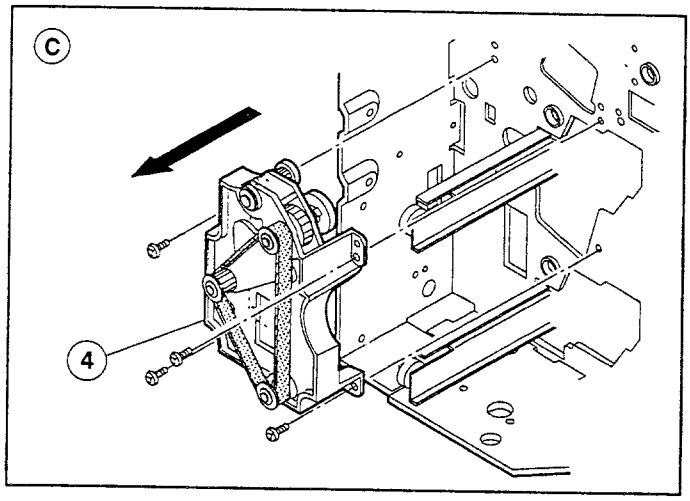
⑪ Remove the suction unit (6 screws).

⑫ Remove the main drive unit.

⑬ Remove the main drive belt.



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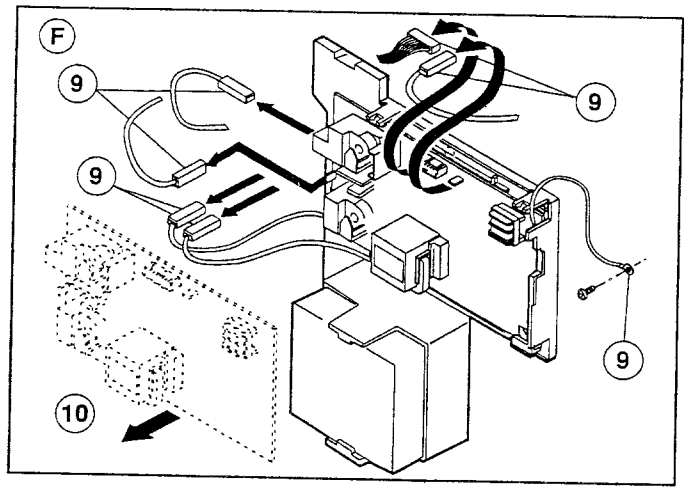
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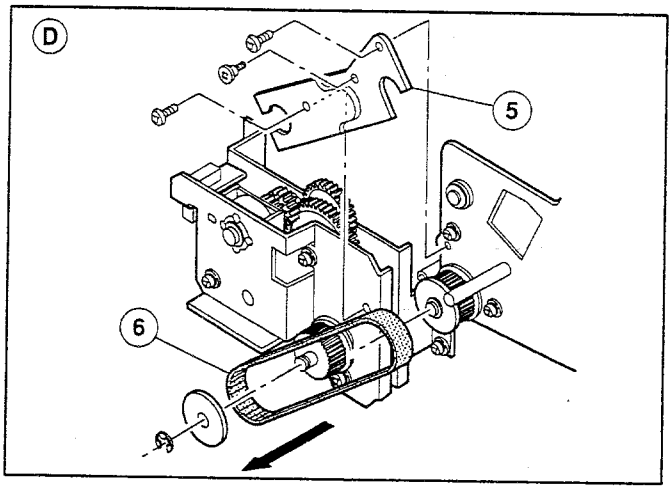
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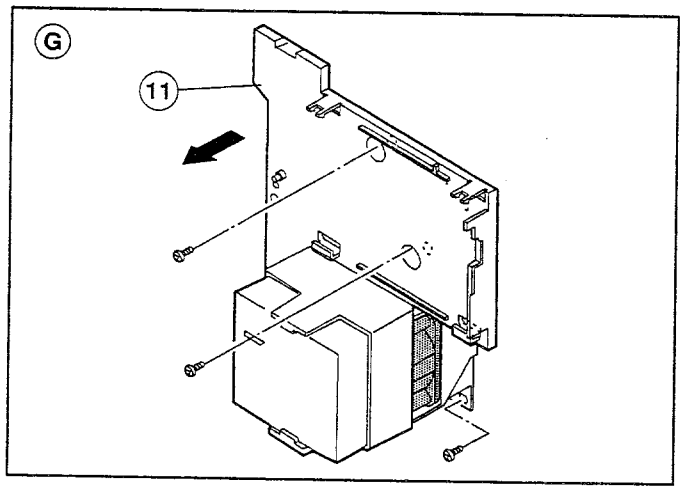
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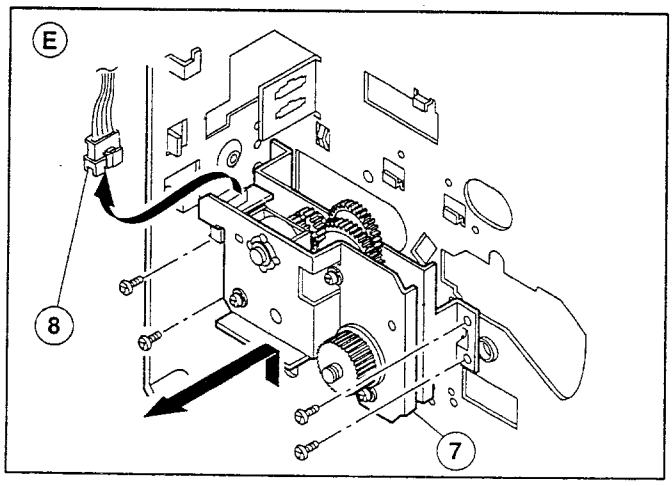
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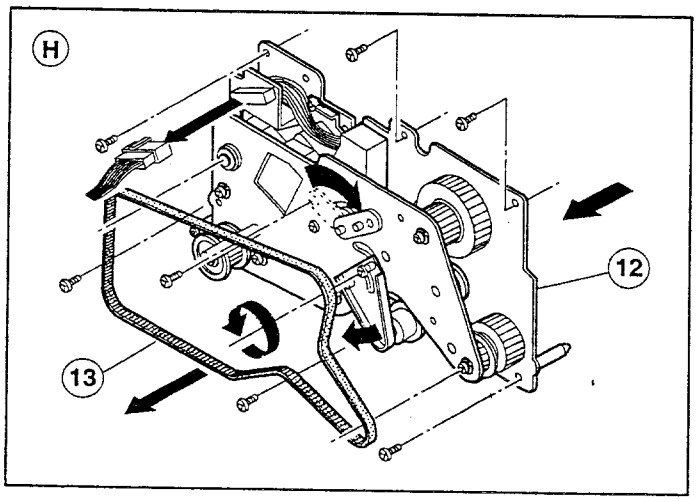
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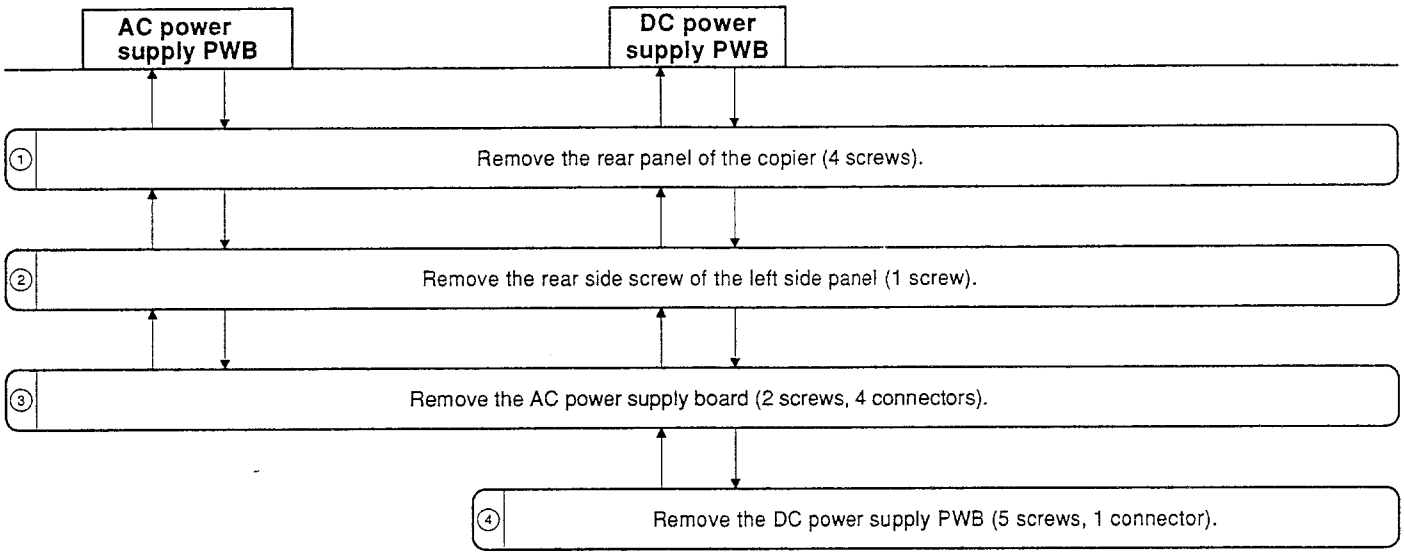
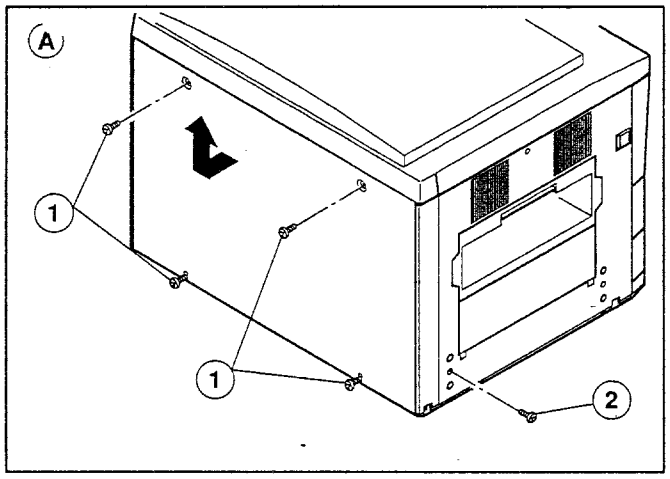
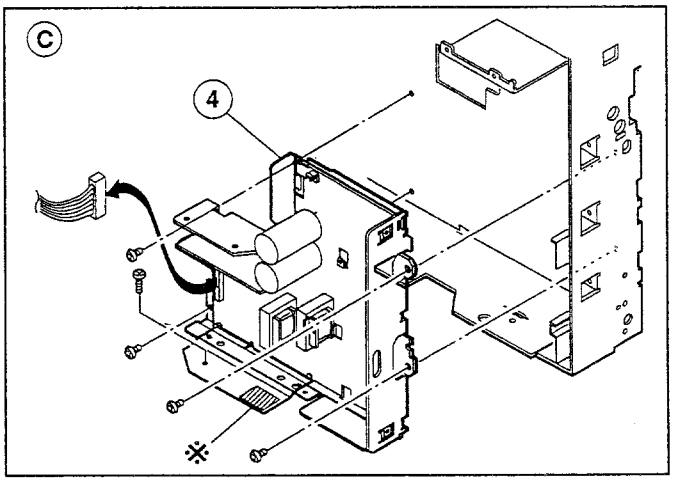
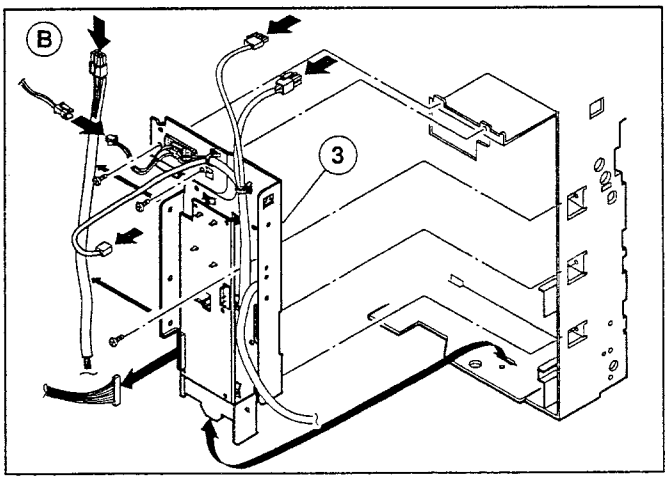

AC power supply PWB
DC power supply PWB
① Remove the rear panel of the copier (4 screws).
② Remove the rear side screw of the left side panel (1 screw).
③ Remove the AC power supply board (2 screws, 4 connectors).
④ Remove the DC power supply PWB (5 screws, 1 connector).

※ DC power PWB identification

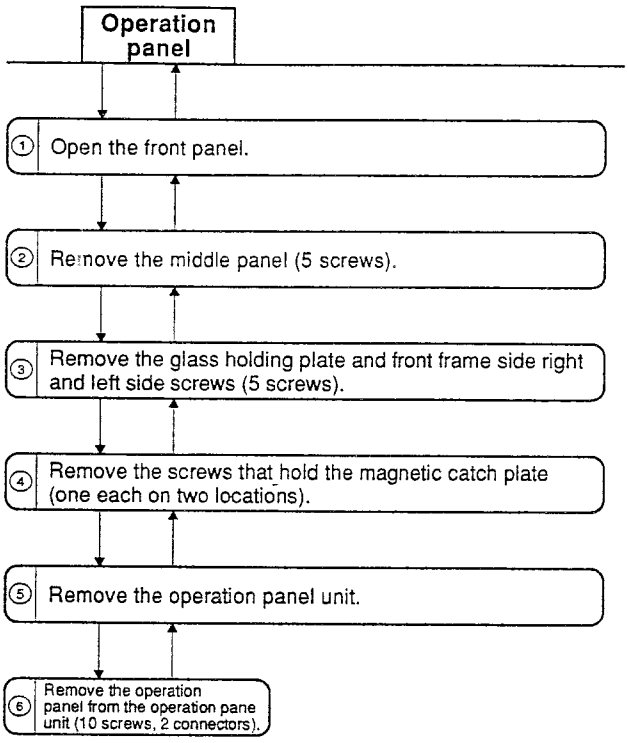
100V system	200V system
White label	Red label



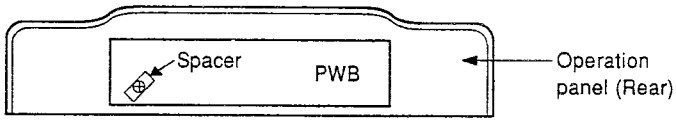


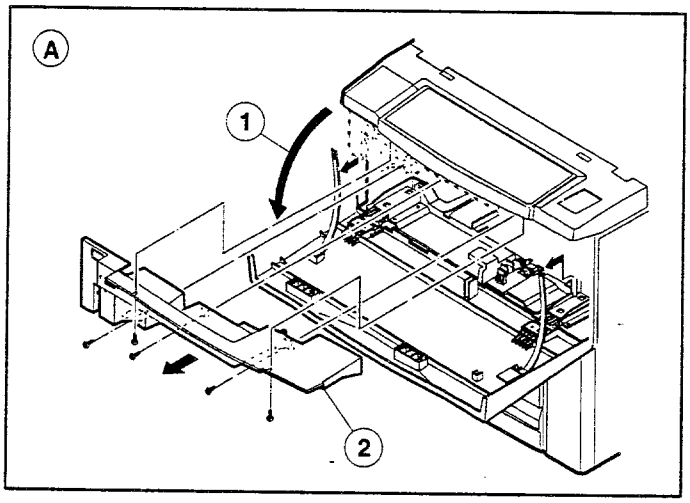


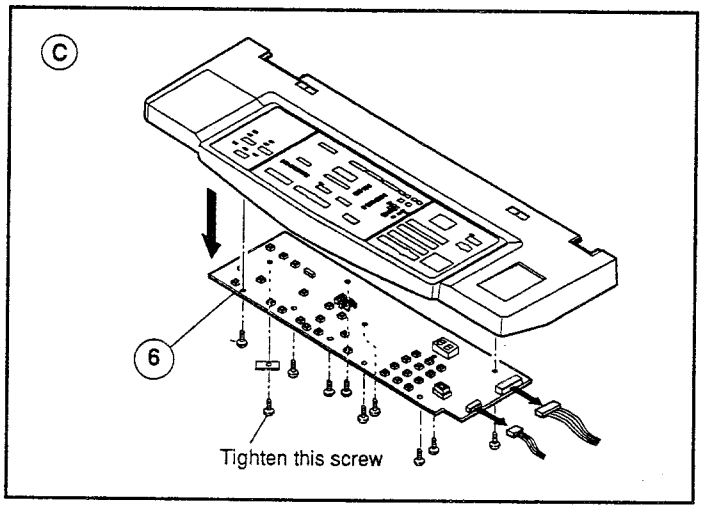
7. Operation panel unit

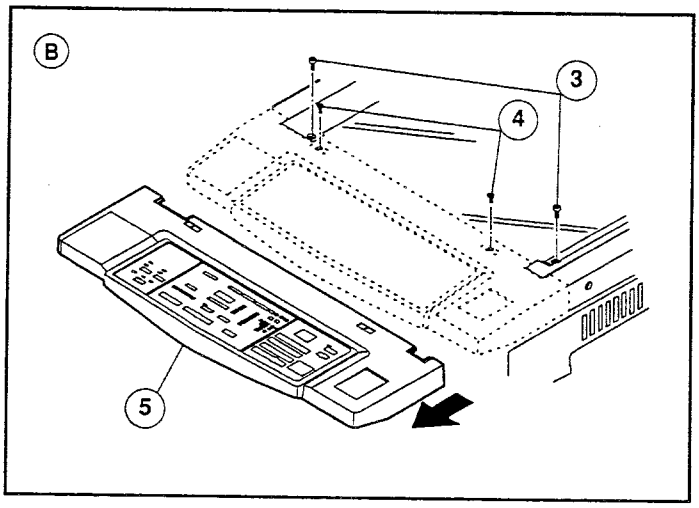

Operation panel
① Open the front panel.
② Remove the middle panel (5 screws).
③ Remove the glass holding plate and front frame side right and left side screws (5 screws).
④ Remove the screws that hold the magnetic catch plate (one each on two locations).
⑤ Remove the operation panel unit.
⑥ Remove the operation panel from the operation pane unit (10 screws, 2 connectors).

Note: Tighten the PWB screw to fix the operation panel (Left) spacer.









8. Optical unit

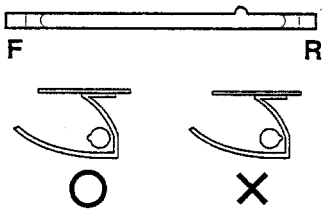
Copy lamp | **Copy lamp unit** | **#2/3 mirror base unit** | **#4/5 mirror base unit**

① Remove the original guides (L, R) and remove the table glass (two each screws).

② Move the copy lamp unit to the cut in the rear of the top cabinet and remove the rear frame side copy lamp electrode holding screw.

③ Remove the copy lamp.

NOTE: Note the direction of the copy lamp.



It must be installed with the bulge of the copy lamp near the rear side, as shown in the figure.

④ Remove the operation panel.
Remove the top cabinet, left.
Remove the left cabinet.

⑤ Remove the upper dark box cover (screw).

⑥ Remove the wire holding plates found on both frame sides of the copy lamp unit, then remove wires from the side plates (F, R).

⑦ Rotate the copy lamp unit to remove.

⑧ Remove the mirror base wire from the #2/3 mirror base unit.

⑨ Move the #2/3 mirror base unit to the square hole (a) on the front side of the optical baseplate, then rotate it to remove.

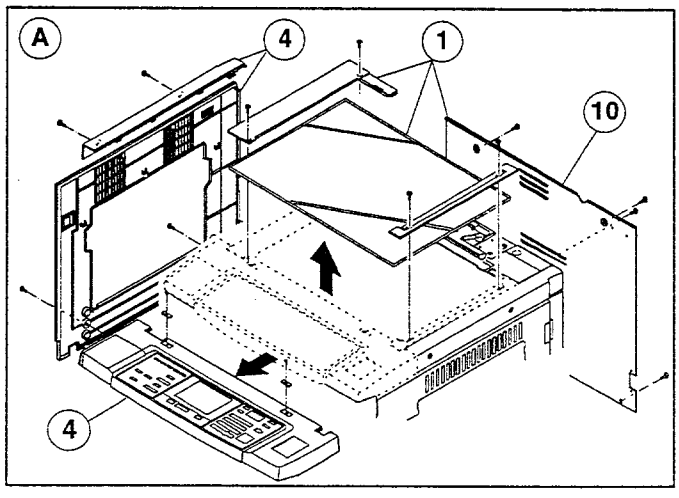
⑩ Remove the rear panel (4 screw).

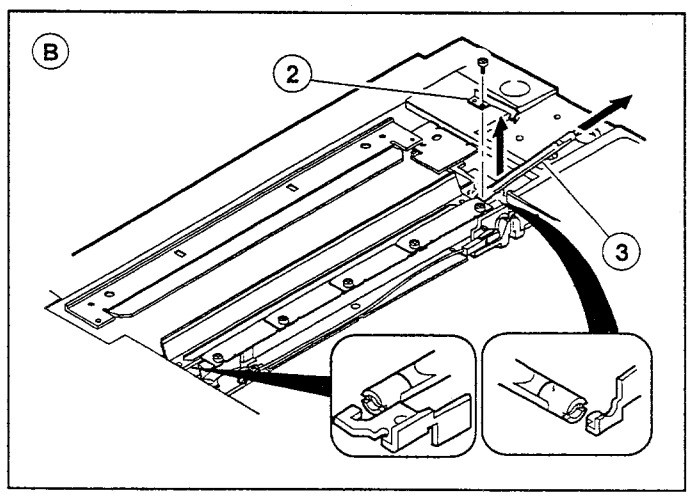
⑪ Record value for assembly.

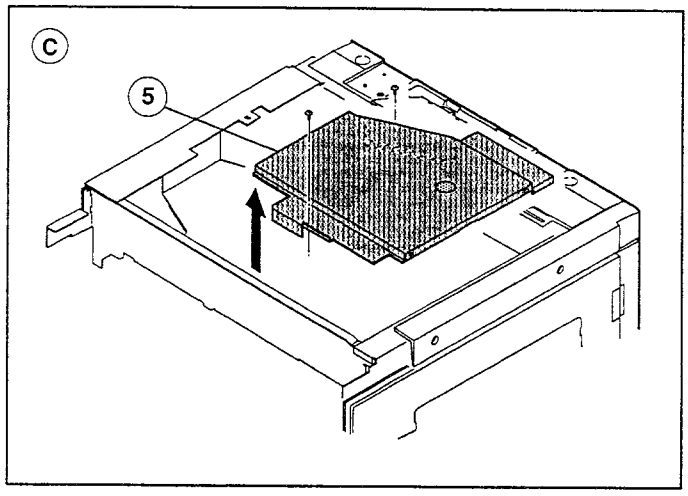
⑫ Remove the #4/5 mirror motor holding bracket (6 screw).

⑬ Remove the optical harness connectors.
Remove the lens motor connectors.
Remove the lens home position sensor connector.
Unfasten the document sensor light receive board connector. Remove the front cabinet switch junction harness.

⑭ Remove the mirror base unit together with the #4/5 mirror motor holding bracket assy.



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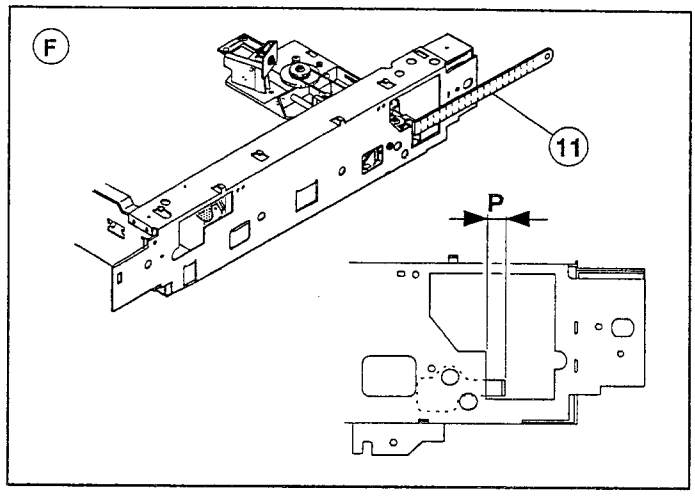
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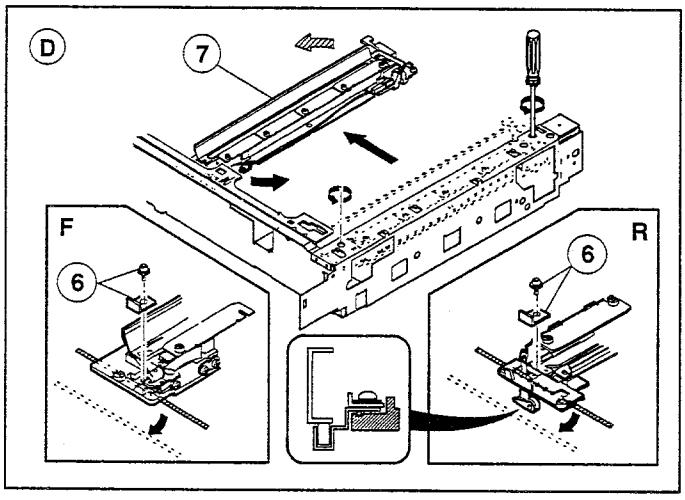
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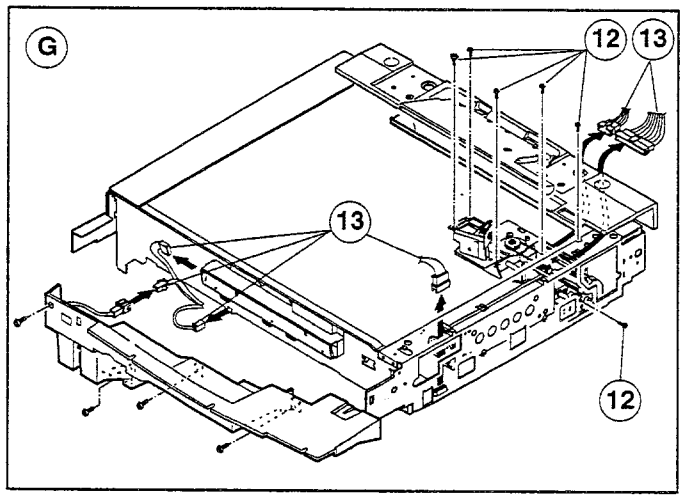
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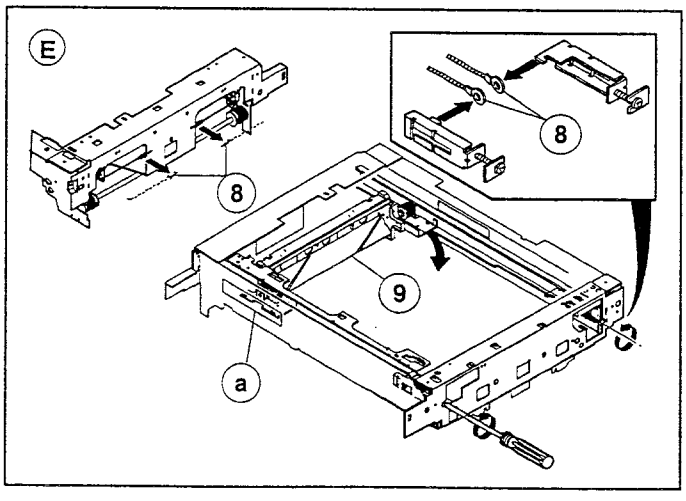
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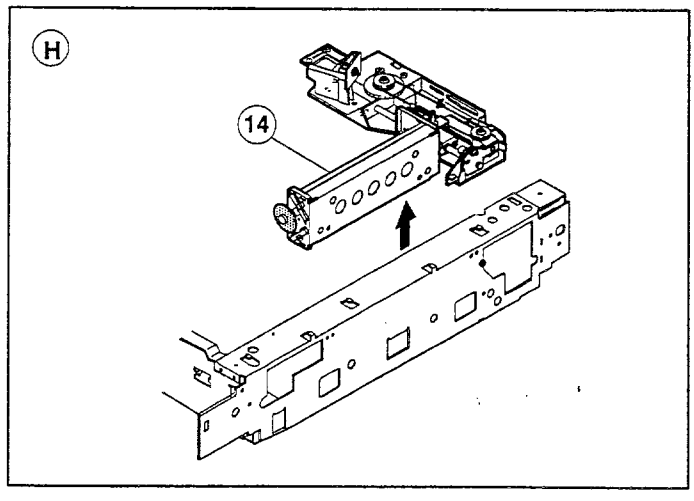
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Mirror base wire stretching

(Preliminary checks)

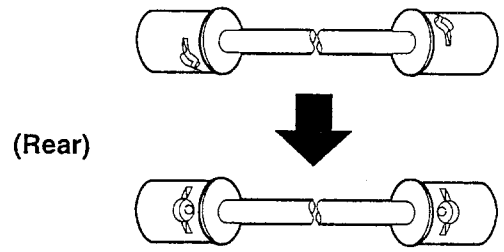
Check the stop position of the wire winding pulley.
Visually check that the wire grooves of the front/rear wire winding pulleys are at the same level.
If there is a substantial discrepancy between the two, loosen the two setscrews which are fixing the pulleys and adjust the pulley positions. After adjustment, tighten the setscrews.

① Hang the mirror base wire fixing fixture on the tension adjustment plate hook.

② Fit mirror base B onto the mirror base positioning plates (front/rear). Pass the mirror base wire along the outer groove of the mirror base B pulley.

③ Pass the mirror base wire along the pulley groove in the paper feed side.

④ Pass the mirror base wire under mirror base B and wind it around the winding pulley.
At that time, fix the wire groove section in the winding pulley to the upper position, wind the mirror base wire 9 times, and put the 8th winding in the groove.



The first winding position should be 9 - 10mm toward the body frame from the pulley groove section.

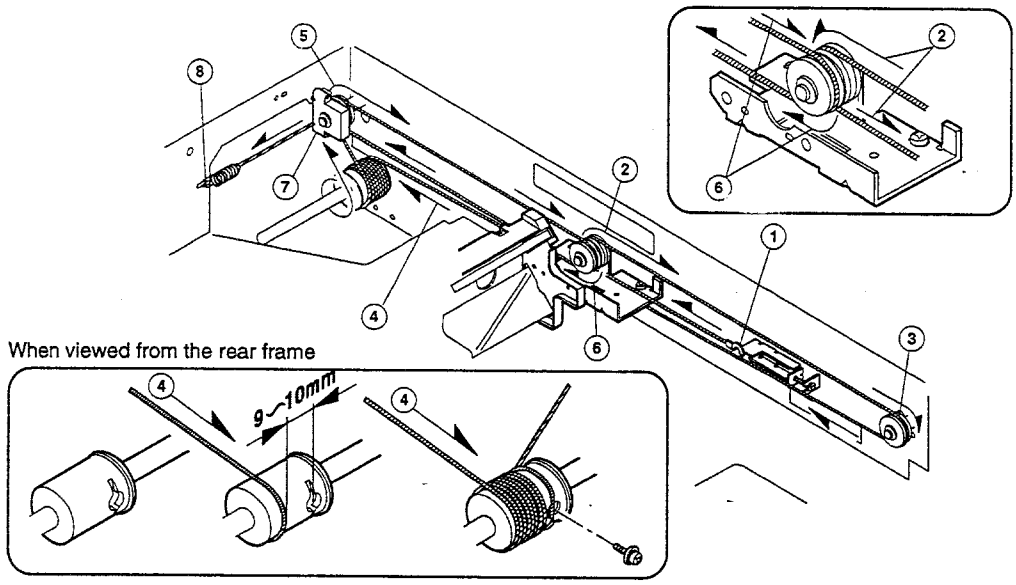
⑤ Pass the mirror base wire along the pulley groove in the paper exit side.

⑥ Pass the mirror base wire along the internal groove of the mirror base B pulley.

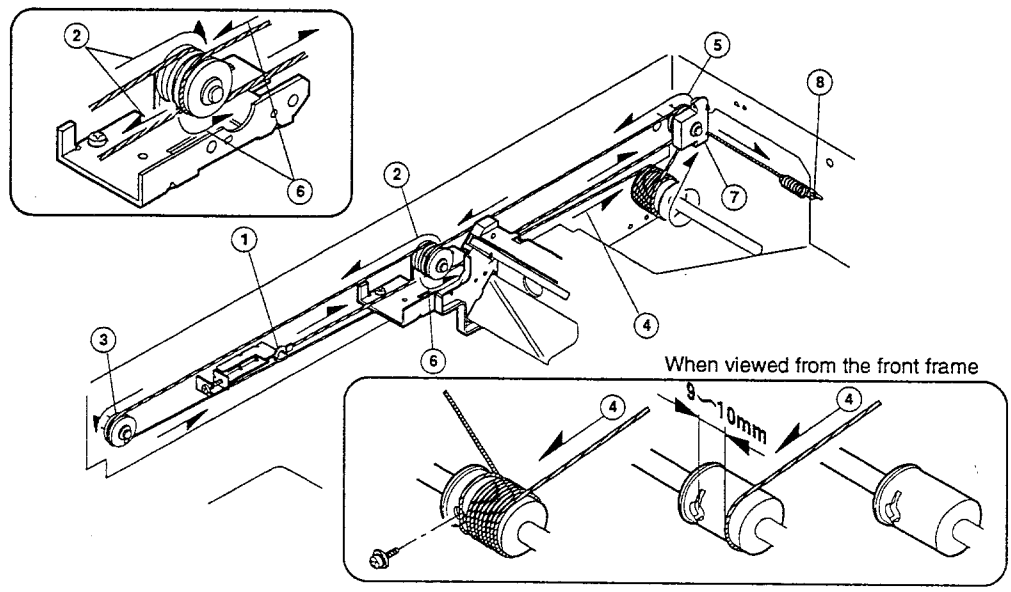
⑦ Pass the mirror base wire through the wire guide.

⑧ Attach the mirror base wire tension spring to the long hole in the optical base plate.

(Rear frame side)



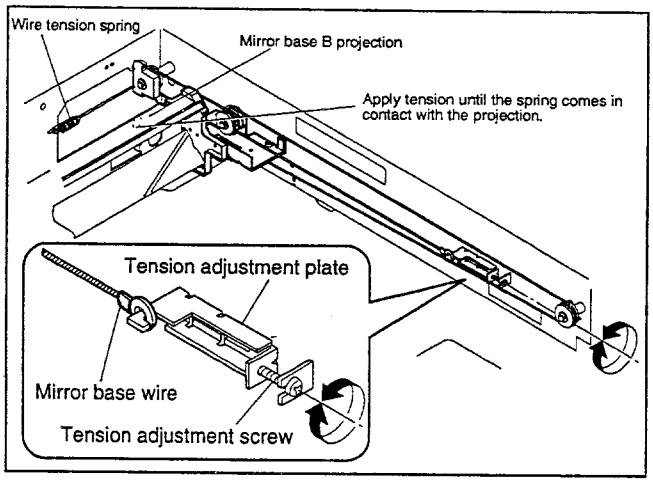
(Front frame side)



Mirror base wire tension adjustment

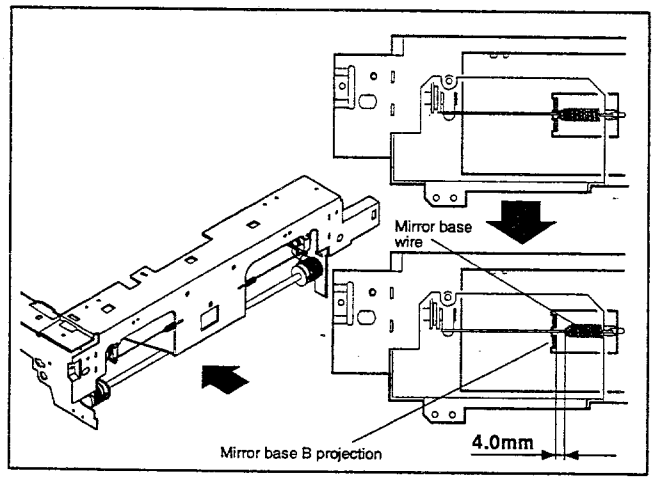
① Manually turn the mirror base drive pulley to shift mirror base B which is at the mirror base positioning plate 20 to 30mm to the paper exit side.

② Turn the mirror base wire tension adjustment screw clockwise to apply tension to the wire until the wire tension spring edge makes contact with the projection of mirror base B.


Wire tension spring
Mirror base B projection
Apply tension until the spring comes in contact with the projection.
Tension adjustment plate
Mirror base wire
Tension adjustment screw

③ manually turn the mirror base pulley to make mirror base B perform full scan a few times, and check that the mirror base wire spring edge is in contact with the projection of mirror base B. If they are not in contact with each other, adjust by turning the tension adjustment screw again. In this case, check also that there are no slack in the wire on the mirror base pulley.

④ Turn the mirror base wire tension adjustment screw 6 turns counterclockwise. (Then the distance between the mirror base wire spring and the projection of mirror base B will be about 4mm.)

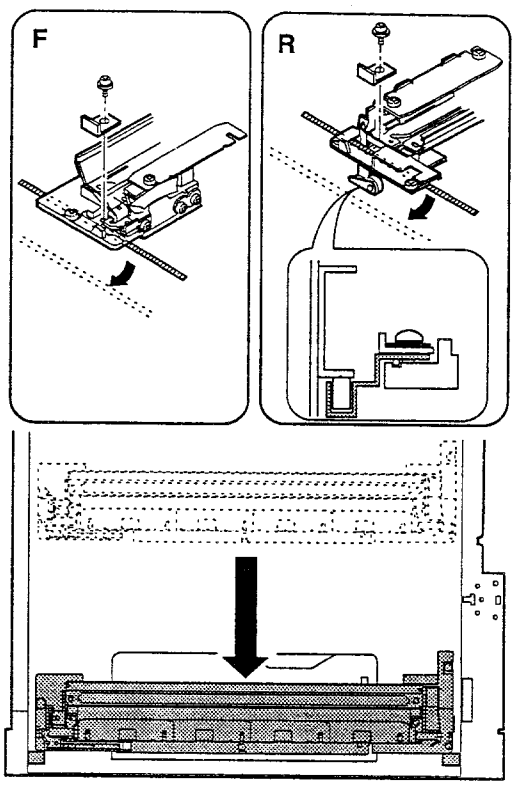


(Perform the same procedures for the front frame side and the rear frame side.)

Copy lamp unit installing position

① Pass the front/rear mirror base drive wire between the copy lamp unit frame and the wire fixing plate.
In this case, do not tighten the wire fixing screw.

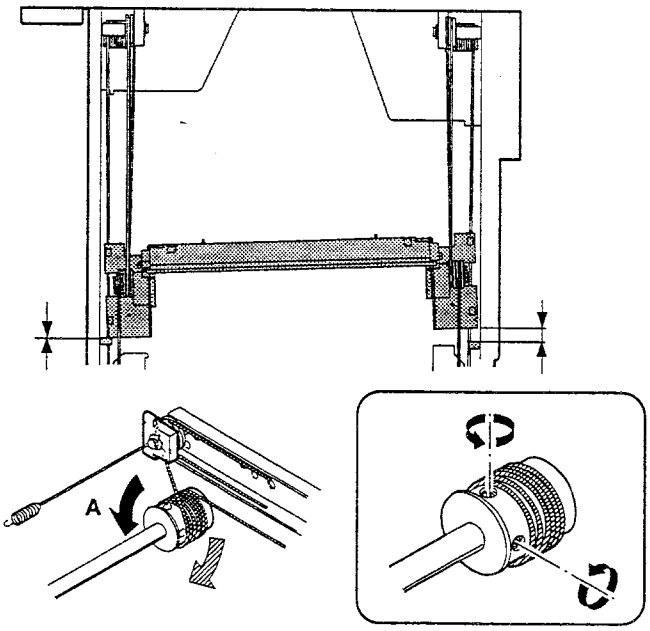
② Press the copy lamp unit onto the positioning plate and tighten the wire fixing plate.



No. 2/3 mirror base unit installing position

This adjustment is to adjust parallelism of the mirror base B to the drum surface and the original surface.

① Manually turn the mirror base drive pulley to bring mirror base B into contact with the mirror base positioning plate. IN this case, when the front frame side and the rear frame side of mirror base B are simultaneously brought into contact with the mirror base positioning plate, the parallelism of mirror base B is proper and there is no need for adjustment.

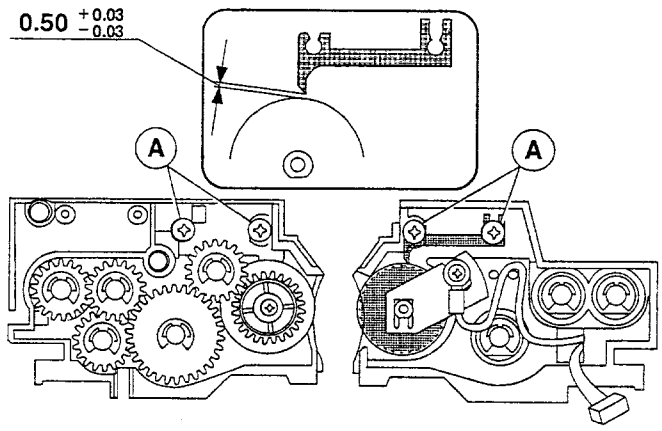


[6] ADJUSTMENTS

1. Developing Unit

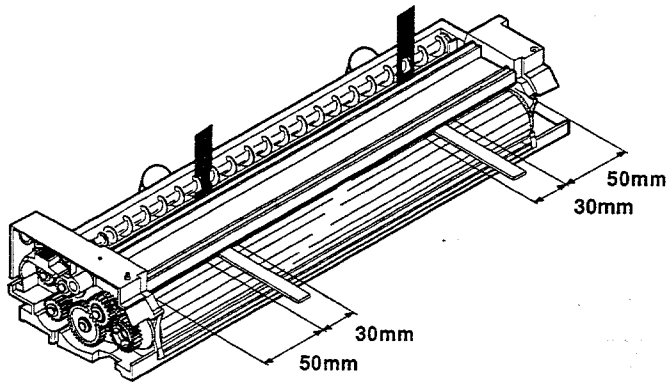
(1) Clearance Adjustment of Developing Doctor Blade

Tool: UKOGM0075CSZZ (Feeler gauge)



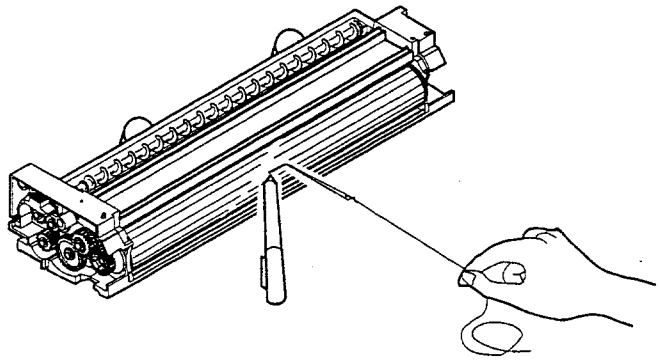
① Remove 4 screws and the 5-pin connector which connect the developer tank to the toner hopper, and pull out the developer tank.
② Loosen 4 setscrews A of the developing doctor blade.
(2 setscrews on the rear frame side and 2 on the front frame side).
③ Insert the 0.50mm-feeler gauges into the clearance between the developing doctor blade and the magnet roller at the points 50-80 mm away from their both ends.

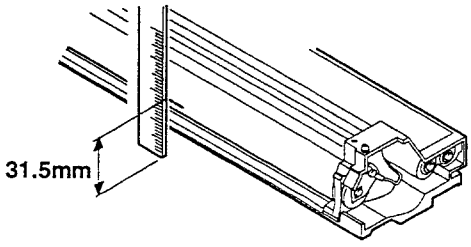
④ While pressing down the developing doctor in the arrow direction, tighten the 4 setscrews to secure the developing doctor.
⑤ Check that the clearance between the developing doctor and the magnet roller is $0.50^{+0.03}_{-0.03}$mm at the points 50-80 mm away from the doctor ends.
Caution: Do not damage the developing doctor blade and the magnet roller during insertion of the feeler gauge.

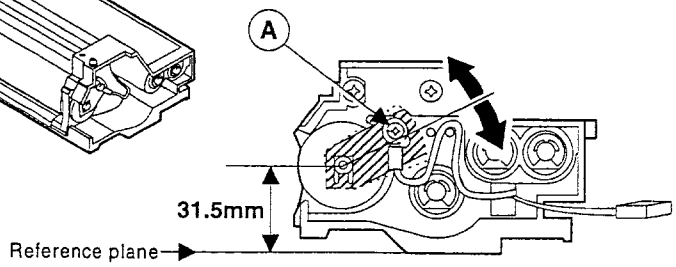


(2) Position Adjustment of Developing Magnet Roller Main Pole

① Remove 4 screws and the 5-pin connector which connect the developer tank to the toner hopper, pull out the developer tank and put it on a flate surface.
② Thread a needle or pin as shown in the figure on the right.
③ While holding the thread, bring the needle near the magnet roller. (Do not use a clip because it will not provide an accurate position of the main pole).
④ Use a pen to put a mark on the point of the magnet roller surface to which the needle is attracted.
⑤ Measure the distance from the mark to the reference plane on which the developer tank is placed.
This distance must be 31.5 mm.
If not so, loosen setscrews A of the main pole adjusting plate and move the adjusting plate in the arrow direction to obtain the proper distance.



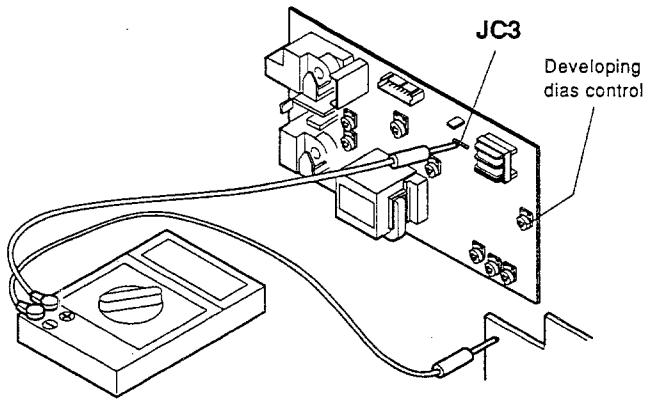




(3) Developing Bias Adjustment

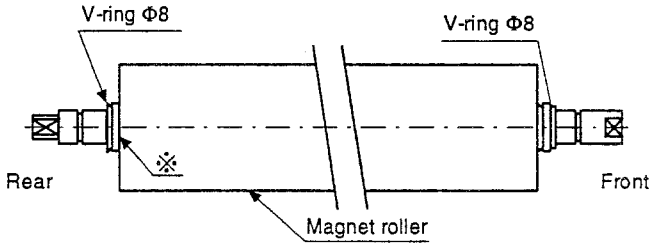
① Set the measuring range of the digital multimeter to 300 Vdc or more.
② Apply the probes to the developing bias output check pin and the chassis(GND) of the high voltage unit.
③ Perform Simulation 8-1. (The developing bias voltage is output for 30 seconds.
④ Adjust the developing bias control for –215 Vdc output voltage.

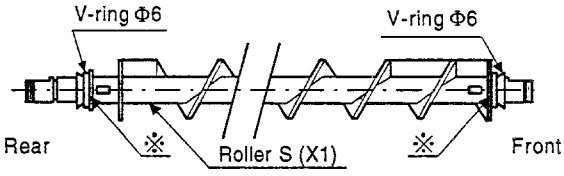
Tool: UKOGE0043CS01 (Digital multimeter)

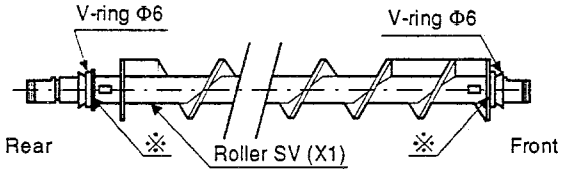


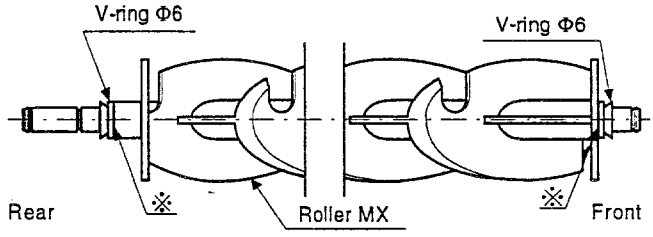
(4) Notes on installing various rollers of the developing unit

(1) V-rings must be attached in the correct direction.
(2) No gap must exist at ※ between the V-ring and the roller.
(3) When attaching ϕ8-ring PRNGP0013FCZZ, ϕ8-ring PRNGP0022FCZZ and ϕ6-ring PRNGP0015FCZZ to the developing magnet roller,
  1) the direction of the V-ring must be as shown in the upper figure, and
  2) no gap must exist at ※ between the V-ring and the roller.



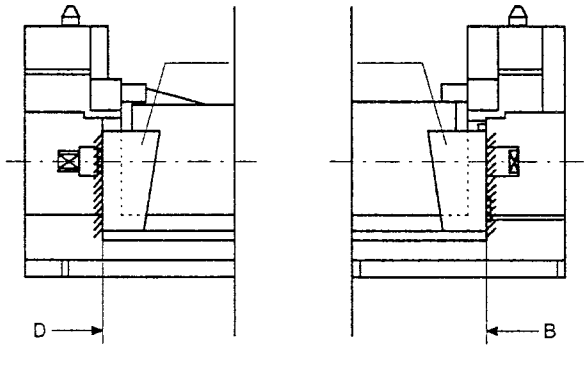


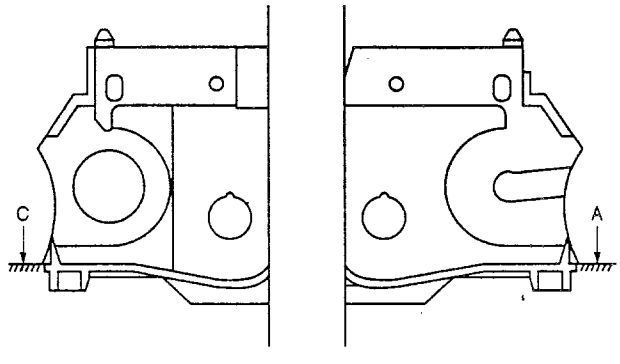




(5) Notes on applying the developing side seals (front and rear)

(1) The side seal must be applied on the surface free of oil, grease and foreign matter.
(2) The side seal must be securely attached to prevent it from coming off.

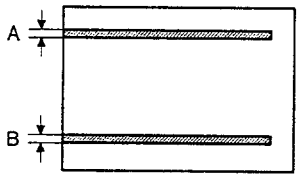




2. Processing Unit

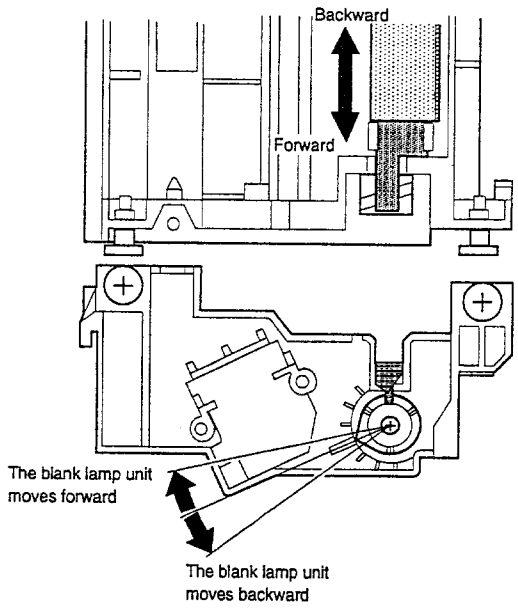
(1) Adjustment of Blank Lamp Position

① Check that the center deviation is 2.0mm or less. (If the center deviation is more than 2.0 mm, correct it).
② Set an A3(11x17)-size blank original on the original table, and with the original cover opened, make a reduced (x 0.64) copy using an A3 (11 x 17) paper.
③ Measure the width of solid areas. If the width is more than 1 mm, adjust the blank lamp unit position so that the width of the solid areas is 1 mm or less.



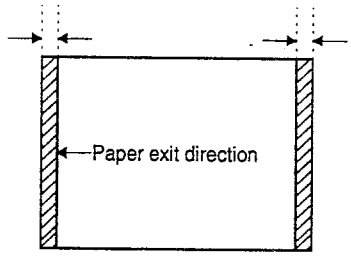
|A-B|≦1mm

1 notch of the adjusting cam : lamp movement 0.5 mm
Half notch of the adjusting cam : lamp movement 0.25 mm



(2) Adjustment of Solid Width of Both Ends

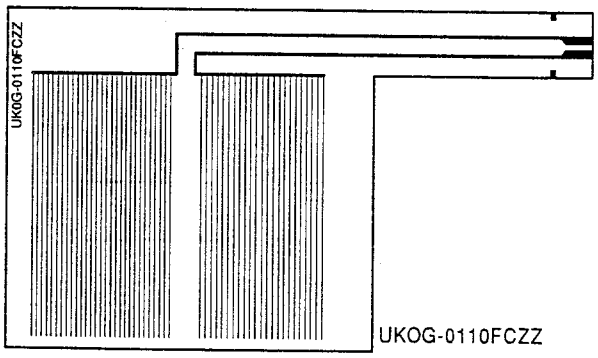
① Perform Simulation 51-05.
The ready lamp goes on and the copy quantity indicator show preset value. Now you can use ten keys to input a value ranging from "1" to "19". Turning on the print switch after value input causes the value to be stored in memory and the ready lamp to go off. Input value of 1 provides approx. 1.0 mm reduction of the solid width. The factory-set value is 6.



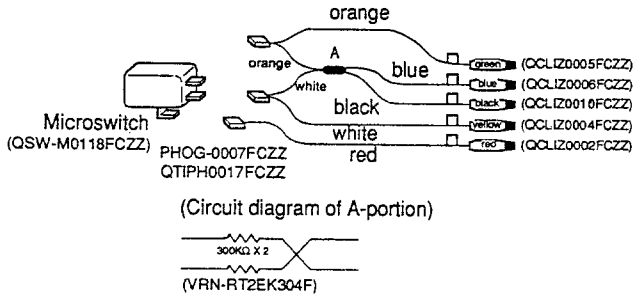
(3) Adjustment of High-Voltage Output Balance

A. Applying the Special Measuring Tool

Electrode sheet (UKOG-0110FCZZ)



Electrode sheet harness (DHAI-0304FCZZ)

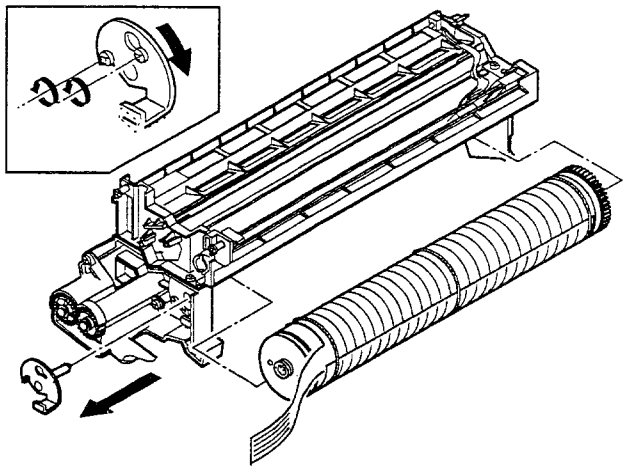


(Circuit diagram of A-portion)

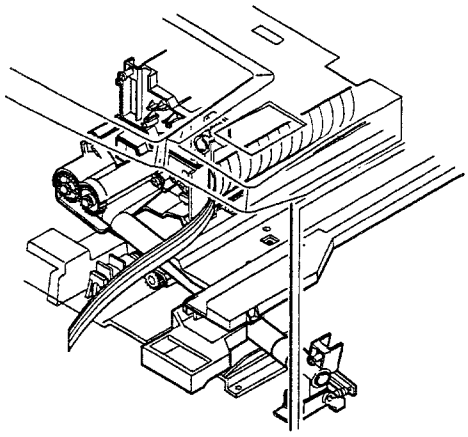
Digital multimeter (or ampere meter)
Note: use a multimeter with measuring range of 0 to 100 μA and error of ±1% or less.

B. Adjusting the Transfer Charger Current

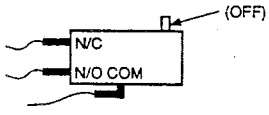
① Remove the developing unit, transfer/separation charger unit, main charger unit and waste toner bottle from the machine.
② Remove the processing unit from the machine.
When removing (attaching) the processing unit, do not grasp the toner feed pipe.
③ Remove the photoreceptor drum from the processing unit and mount the electrode sheet on the drum using adhesive tape.
④ Install the photoreceptor drum into the processing unit and attach the processing unit to the machine.
⑤ Attach the drum holder unit to the machine in the manner which allows drawing the lead of the electrode sheet from the developer tank side.

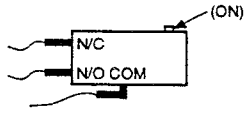


⑥ After cleaning the transfer charger wire, attach the transfer/separation charger unit to the machine. (Do not attach the main charger unit).

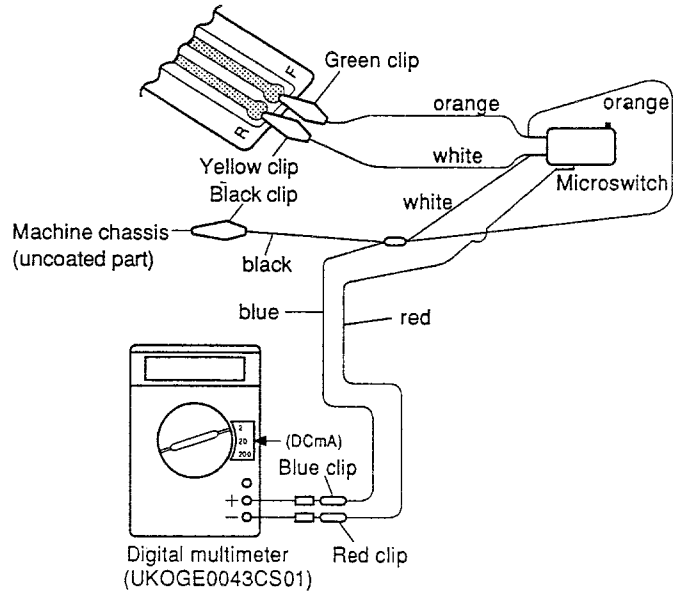


⑦ Connect the electrode sheet to the digital multimeter (or an ampere meter).
Manually turn on the door switch.
⑧ Measure the drum current on the sides of front and rear frame. The difference in current between the front and rear frame must be 8.0 μA or less.
a. Turn on the main switch and perform Simulation "8-06". (THVG will be ON for approx. 30 seconds)
b. Measure the drum current on the front and rear frame side.
- If the microswitch is OFF, the drum current on the side of front frame is indicated.
- If the microswitch if ON, the drum current on the side of rear frame is indicated.





c. Check that the difference in current between both sides is 8.0 μA or less. If the difference is more than 8 μA, replace the charger unit.
⑨ Adjust the THVG output voltage:
a. Turn on the main switch and perform Simulation "8-06". (THVG will be ON for approx. 30 seconds)
b. Use the THVG output control to adjust the THVG output voltage until it becomes −31±5 μA.



Note: Make sure the black clip is grounded at the machine chassis.
When using UKOGE0043CS01:
Control 1: set to DCmA
Control 2: set to 2
Red clip : connected to ⊕
Blue clip: connected to ⊖
When using a d.c. ampere meter:
Red clip : connected to ⊖ of d.c. ampere meter
Blue clip: connected to ⊕ of d.c. ampere meter

C. Checking the Electrostatic Main Charger Current

The drum current difference(balance) between the sides of front and rear frame is checked.

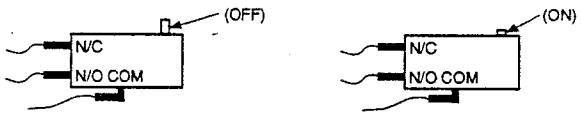
① Perform steps (3)-B-① to ⑤.

② Clean the saw-tooth plate of the main charger and attach the main charger to the machine.
(Do not attach the transfer/separation charger).
Manually turn on the door switch.

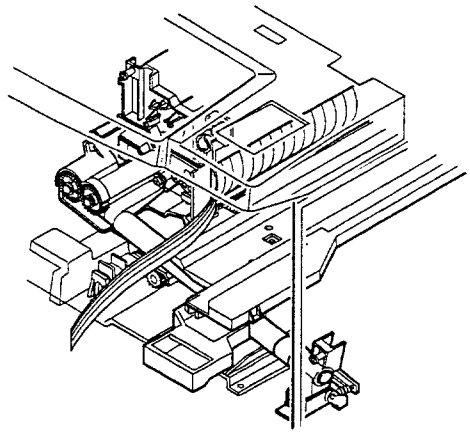
③ Measure the drum current on the sides of front and rear frame. The difference in current between the front and rear frame must be 8.0 μA or less.

a. Turn on the main switch and perform Simulation "8-02".
(MGVG will be ON for approx. 30 seconds.)

b. Measure the drum current on the front and rear frame side.
- If the microswitch is OFF, the drum current on the side of front frame is indicated.
- If the microswitch if ON, the drum current on the side of rear frame is indicated.



c. Check that the difference in current between both sides is 8.0 μA or less. If the difference is more than 8 μA, replace the charger unit.



D. Adjusting the Electrostatic Main Charger Grid Voltage

① Turn off machine. Attach the developing unit and the drum holder unit to the machine.
(Do not use the electrode sheet).

② Attach the main charger unit to the machine. The machine should have all the charger units installed.

③ Remove the rear cover.

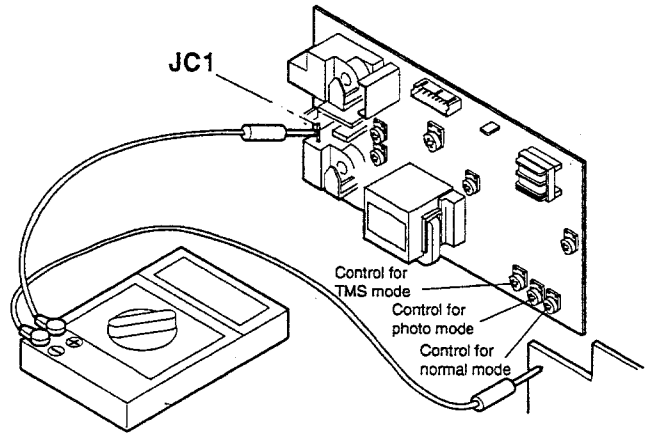
④ Connect the digital multimeter to the grid voltage check pin(JC1).

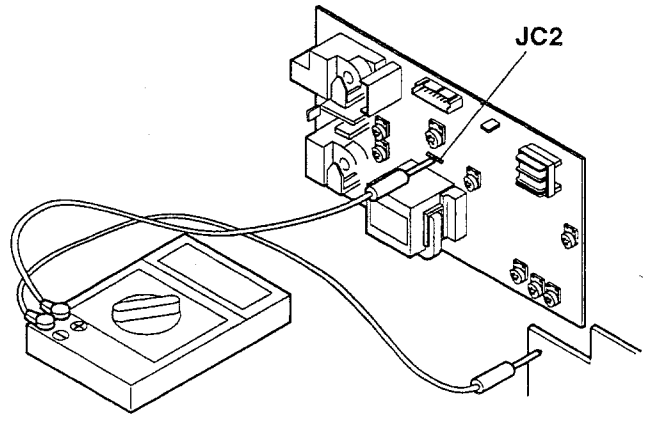
⑤ Set the measuring range of the digital multimeter to DCV.
(Use the digital multimeter with measuring range of up to 1000 Vdc).

⑥ Turn on the front cover switch manually.

⑦ Turn on the main switch, and adjust the output adjusting control so that output voltage values in Simulation "8-02"(normal mode), "8-03"(photo mode) and "8-04"(TSM mode) are as follows:

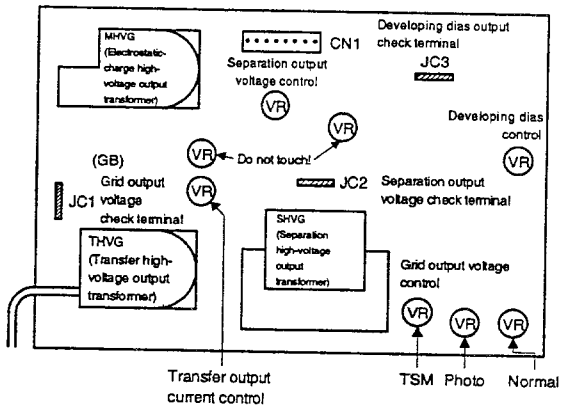
TEST POINT JC.1	Output Voltage
Normal mode	−730±15 Vdc
Photo mode	−490±15 Vdc
TMS mode	−610±15 Vdc





E. Adjusting the Separation Charger Output

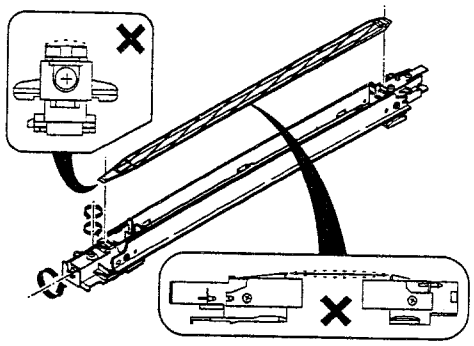
① Attach the developing unit and the drum holder unit to the machine and turn on the machine.
(Do not use the electrode sheet).
② Attach the separation charger unit and drum holder unit to the machine. The machine should have all the charger units installed.
③ Remove the rear cover.
④ Connect the digital multimeter to the SHVG output check pin(JC2).
⑤ Set the measuring range of the digital multimeter to DCV.
⑥ Turn on the door switch manually.
⑦ Perform Simulation "8-07". (The SHVG will goes on for approx. 30 min).
⑧ During the simulation, adjust the SHVG output control so that the output monitoring voltage (bias) JC2 of the separation charger is 0±10 Vdc.



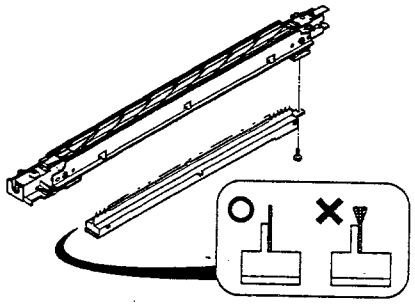
(4) Notes on maintenance for high-voltage units

A. Electrostatic Charger Unit

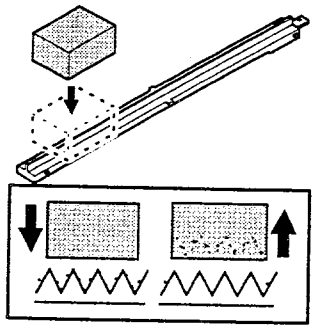
① Do not distort nor stain the screen grid during handling. Be sure that the screen grid is secured in place.



② The teeth of the saw-tooth assembly must be free of distortion.

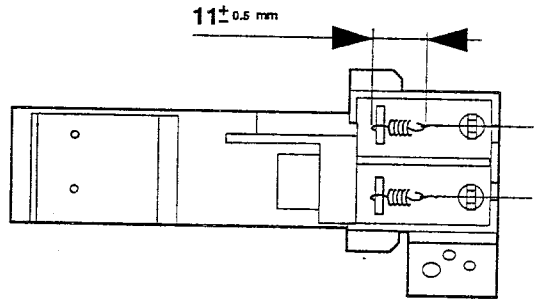


③ Do not touch the inside of the MC case(saw-tooth assembly side), the screen grid, and the saw-teeth.
④ The saw-teeth should be cleaned with foam polystyrene as shown in the figure.

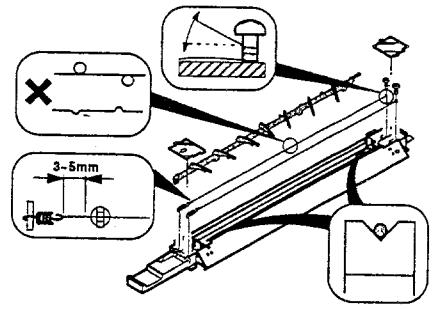


B. Transfer/Separation Charger Unit

① The charger spring must be 11±0.5 mm in length.



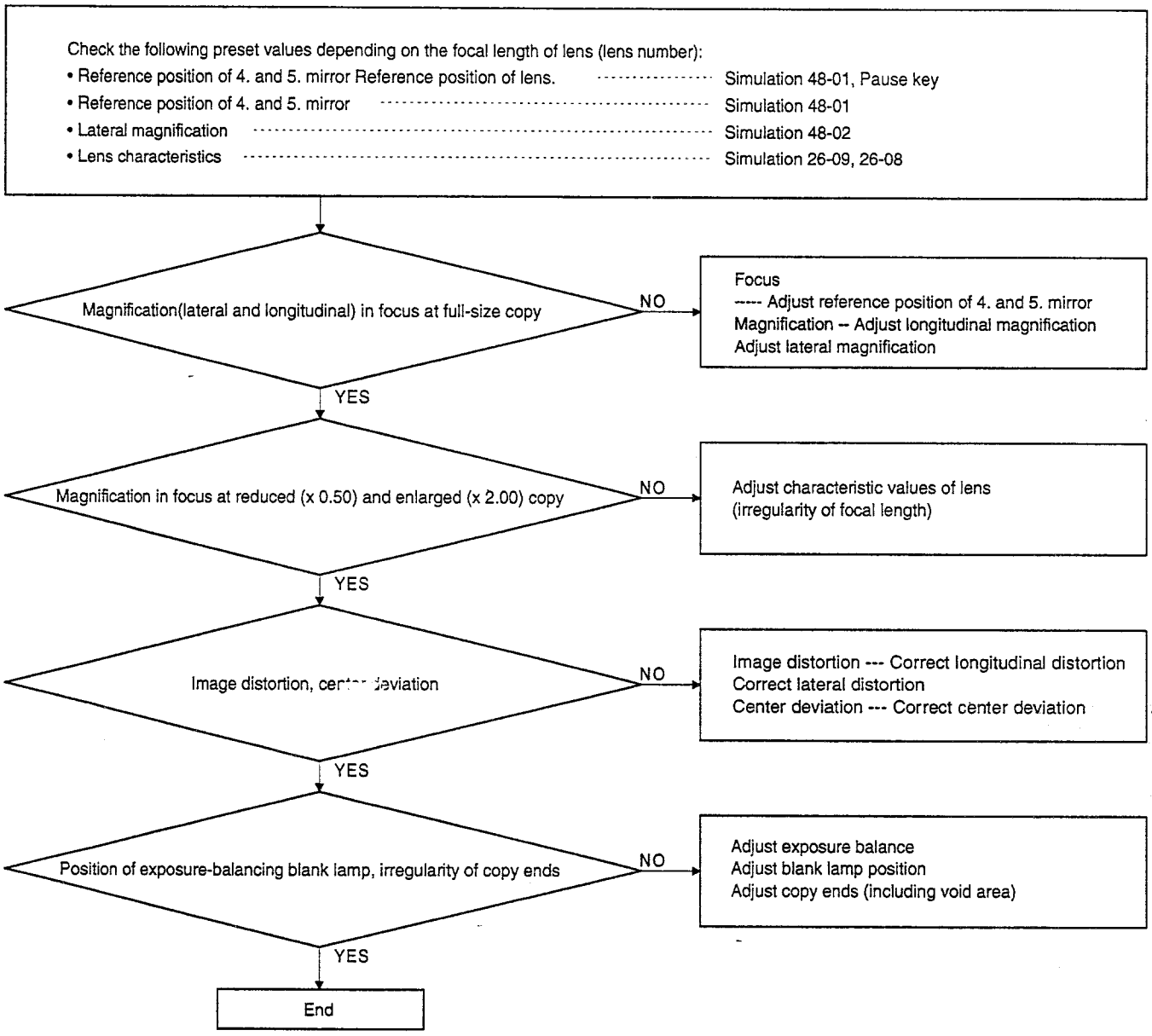
② The charger wire must be free of distortion and fitted in the holder groove.



③ The charger case must be free of oil, grease and foreign matter.
④ The wire must be cleaned with alcohol.

3. Adjustment of Optical System

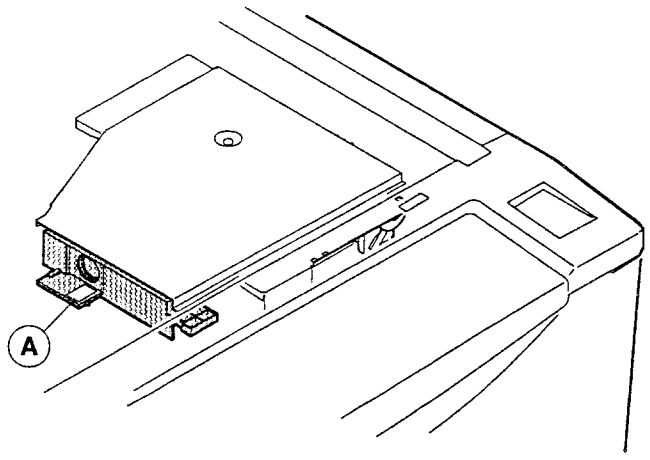
The optical system must be adjusted according to the following flowchart:


Check the following preset values depending on the focal length of lens (lens number):
• Reference position of 4. and 5. mirror Reference position of lens. ····· Simulation 48-01, Pause key
• Reference position of 4. and 5. mirror ····· Simulation 48-01
• Lateral magnification ····· Simulation 48-02
• Lens characteristics ····· Simulation 26-09, 26-08
Magnification(lateral and longitudinal) in focus at full-size copy
NO
Focus
----- Adjust reference position of 4. and 5. mirror
Magnification -- Adjust longitudinal magnification
Adjust lateral magnification
YES
Magnification in focus at reduced (x 0.50) and enlarged (x 2.00) copy
NO
Adjust characteristic values of lens
(irregularity of focal length)
YES
Image distortion, center deviation
NO
Image distortion --- Correct longitudinal distortion
Correct lateral distortion
Center deviation --- Correct center deviation
YES
Position of exposure-balancing blank lamp, irregularity of copy ends
NO
Adjust exposure balance
Adjust blank lamp position
Adjust copy ends (including void area)
YES
End

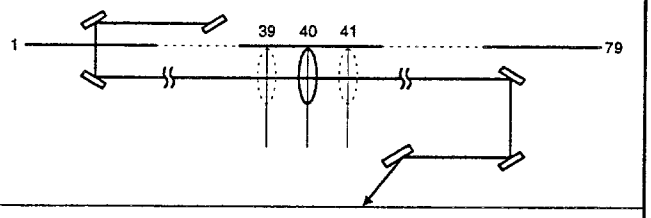
* The exposure balance, blank lamp position and copy ends can be separately adjusted. But items other than these must be adjusted according to the steps shown in the above flowchart.

(1) Adjusting the Reference Position of Lens

A reference value depending on lens characteristics must be input for adjusting the reference position of lens.
(This value determines the home position of lens).
(Procedure)
Perform Simulation 48-01 [=J] .
[C] → [=J] → [0] → [=J] → [4] → [8] → [PSW] → [1] → [PSW] → [=J] causes a preset value or "40" to → be shown on the copy quantity indicator.

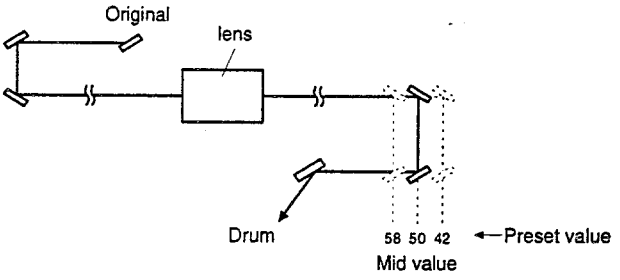


Substitute the value (irregularity of distance between original and lens ⇒ −3.9 to +3.9) on the label applied on A shown in the right figure, for "0-L" of the expression "O-L" is the value on label.
40 − [(O − L) x 5] = reference value for correction
and type the result.
Eg.: If the result (reference value for correction) is 1.2 ;
40 − (1.2 x 5)= 34 value to be input



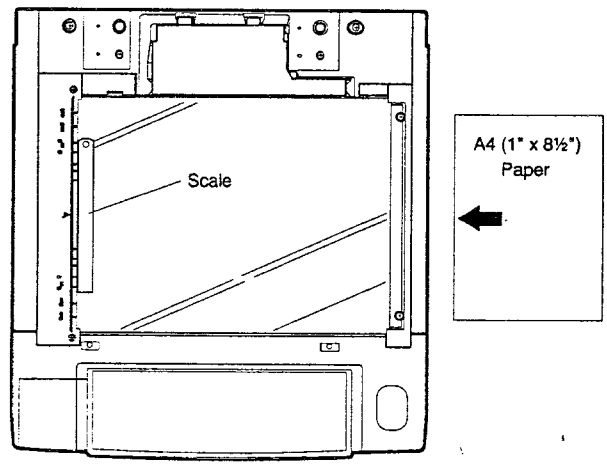
(2) Adjusting the Reference Position of 4. and 5. Mirror

A reference value corresponding on lens characteristics must be input also for adjusting the reference position of 4. and 5. mirror.
(This value determines the home position of 4. and 5. mirror base).
(Procedure)
Perform Simulation 48-01 [=J] .
[C] → [=J] → [0] → [=J] → [4] [8] → [PSW] → [1] → [PSW] causes a preset value or "50" to be shown on the copy quantity indicator.
Substitute the value described above for "O − L" of the expression 50 − [(O − L) x 10]= reference value for correction and type the result.
Eg.: If the result (reference value for correction) is 1.2 ;
50 − (1.2 x 10) = 38 value to be input
If the preset reference value is larger than the mid value "50", the 4. and 5. mirrors are set further away from lens.
If the preset reference value is smaller than mid value "50", the mirrors are set closer to lens.

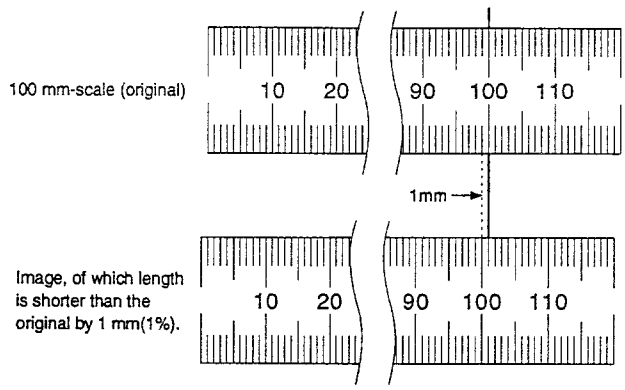


(3) Adjusting the Vertical copy Magnification ratio

This adjustment must be done while the mirror bases A, B and C are in parallel with each other and the lens is focalized.
① Set a scale on the original table as shown in the right figure.
② Take a full-size copy of the scale using an A4-size(11" x 8.5") paper.
③ Compare the image on the paper with the scale.
④ Determine the correction factor for longitudinal magnification according to the following expression:
Correction factor for longitudinal magnification
$= \frac{(\text{original size} - \text{copy size})}{\text{original size}} \times 100\ (\%)$
Eg.: Correction factor for longitudinal magnification
$= \frac{(100 - 99)}{100} \times 100 = 1$



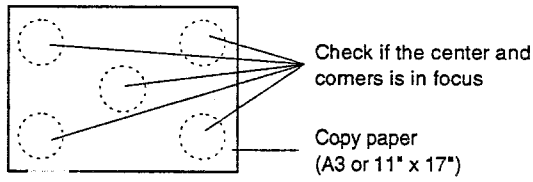
⑤ Perform Simulation 48-01 [=⌟] .
[C] → [=⌟] → [0/◊] → [=⌟] → [4] → [8] → [PSW] → [1] → [PSW] → [=⌟] causes a preset value of longitudinal magnification to be indicated.
⑥ Determine a preset value of longitudinal magnification according to the following expression:
Preset value of longitudinal magnification = [previous preset value(indicated at step ⑤)) + correction factor for longitudinal magnification] x 10
Eg.: Preset value = [25 + 1] x 10 = 35
⑦ Type the preset value of longitudinal magnification:
[ ] → [ ] → [PSW]
Changing the preset by "1" provides the magnification change of 0.1 %.
⑧ Take a full-size copy of the scale and compare the image length with the scale length.
⑨ The image length must be the same as the scale length. Otherwise, repeat the above steps ① to ⑧ until this requirement is met.
⑩ Press the clear all key to clear Simulation 48.



(4) Adjusting the Resolution

Applied Material: UKOG-0089CSZZ (Test chart)

① Perform Simulation 48-01 to check that a preset value corresponds to a focal length of lens used:
[C] → [0/◊] → [0/⌟] → [=⌟] → [4] → [8] → [PSW] → [1] → [PSW] .
When the ready lamp is lit, a preset value (ranging from 1 to 99) is indicated.
② If no preset value exists, set a reference value according to (2)"Adjusting the reference position of 4. and 5. mirror". Then take a copy of "UKOG-0089CSZZ" and check the resolution.
③ When changing a preset value:
[ ] → [ ] → [PSW] .



Checking Procedure
After adjusting the reference position of 4. and 5. mirror, check as follows:
① Set the test chart UKOG-0089CSZZ or a resolution test chart on the original table.
② Take a full-size copy.
③ Check if the center and corners of the copy paper is in focus.
④ The resolution must be at least 5.0 lines/mm in the center and 4.5 lines/mm in the corners. Otherwise, repeat the steps ② to ④ of (2) while changing the preset value by 1 at a time, until this requirement is met.

(5) Adjusting the Horizontal copy Magnification ratio

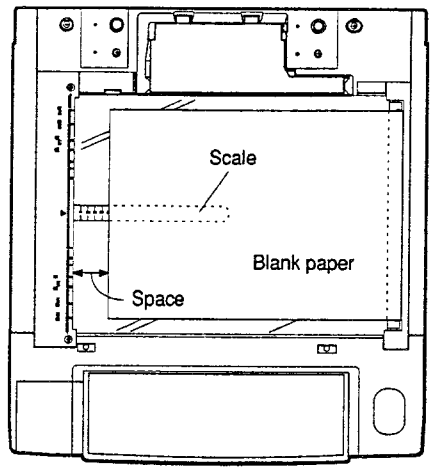
① Set a scale on the original table as shown in the figure and perform Simulation 48-02.
The machine starts the warm-up cycle and the ready lamp is lit. At the same time a preset value (ranging from 15 to 35) is indicated.
Now take a full-size copy of the scale and determine the correction factor for lateral magnification according to the following expression:
Correction factor for lateral magnification = [(original size – copy size)/original size] x 100 (%)

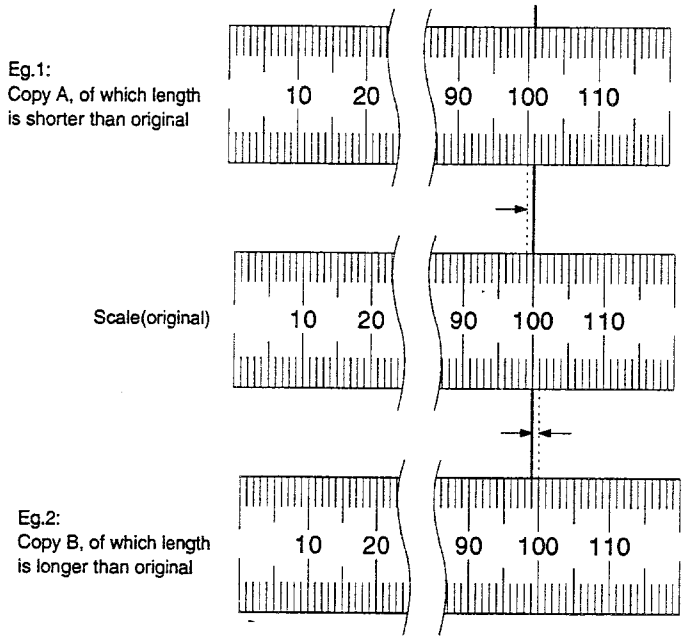
② Use the correction factor to change the indicated value:
Value to be input = (preset value) + (correction factor for lateral magnification(%)) x 10
- Eg.1: 35 = 25 + 1 x 10
- Eg.2: 15 = 25 + (–1 x 10)

When a new value is typed and the print switch is turned on, the new value is stored in memory and the ready lamp goes off.

③ Clear Simulation 48-02.

Note: In Simulation 48-02 the correctable range of the preset value is limited from15 to 35.




Eg.1:
Copy A, of which length is shorter than original
10 20 90 100 110
Scale(original)
10 20 90 100 110
Eg.2:
Copy B, of which length is longer than original
10 20 90 100 110

(6) Inputting the Lens Correction Value

(Simulation 26-08, 26-09)

<Inputting the lens characteristics>

The lens varies in focal length for each machine. The lens travel is required to correspond to the focal length of the lens. If the lens travels at a magnification would be constant among the machines in spite of the focal length irregularity, the magnification could vary depending on this irregularity.
To avoid this problem, we have prepared the table showing focal length ranks of lens and correction data (see the next page) which can be stored in memory at the time of Simulations described below. In order to copy properly at a magnification, the lens travel corresponding to its focal length is calculated on the basis of the stored data.

<When lens is replaced>

① Set correction data according to the "focal length ranks of lens and correction data" table at following Simulation:
[C] → [=⌟] → [0/⌟] → [=⌟] → [2] → [6] → [PSW] → [9] → [PSW] to perform Simulation 26-09.

When the ready lamp is lit, a preset value (ranging from 1 to 21) is indicated.

② Input a new preset value.
Eg.: When a value shown on lens is +1.2, a correction value to be input is 14 according to the table.
[C] → [=⌟] → [0/⌟] → [=⌟] → [2] → [6] → [PSW] → [8] → [PSW] to perform Simulation 26-08.

Value shown on the label (O – L)	Test command 48-01	Test command 48-01 [=↵]	Test command 26-09 Zoom correction (No.4/5 mirror)	Test command 26-08 Zoom correction (lens)
+4.0	10	20	21	21
3.9	11	21		
3.8	12	22		
3.7	13	22	20	20
3.6	14	22		
3.5	15	23		
3.4	16	23		
3.3	17	24	19	19
3.2	18	24		
3.1	19	25		
3.0	20	25		
2.9	21	26	18	18
2.8	22	26		
2.7	23	27		
2.6	24	27		
2.5	25	28	17	17
2.4	26	28		
2.3	27	29		
2.2	28	29		
2.1	29	30	16	16
2.0	30	30		
1.9	31	31		
1.8	32	31		
1.7	33	32	15	15
1.6	34	32		
1.5	35	33		
1.4	36	33		
1.3	37	34	14	14
1.2	38	34		
1.1	39	35		
1.0	40	35		
0.9	41	36	13	13
0.8	42	36		
0.7	43	37		
0.6	44	37		
0.5	45	38	12	12
0.4	46	38		
0.3	47	39		
0.2	48	39		
+0.1	49	40	11	11
0	50	40		
–0.1	51	40		
0.2	52	41	10	10
0.3	53	41		
0.4	54	42		
0.5	55	42		
0.6	56	43	9	9
0.7	57	43		
0.8	58	44		
0.9	59	44		
1.0	60	45	8	8
1.1	61	45		
1.2	62	46		
1.3	63	46		
1.4	64	47	7	7
1.5	65	47		
1.6	66	48		
1.7	67	48		

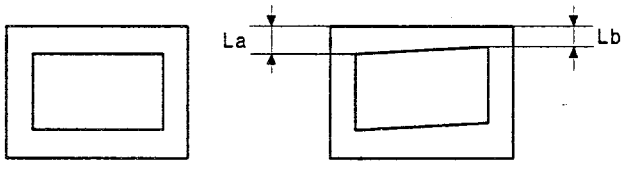
(Lens value input vs. test command input)

Value shown on the label (O – L)	Test command 48-01	Test command 48-01 =J	Test command 26-09 Zoom correction (No.4/5 mirror)	Test command 26-08 Zoom correction (lens)
1.4	64	47	7	7
1.5	65	47		
1.6	66	48		
1.7	67	48		
1.8	68	49	6	6
1.9	69	49		
2.0	70	50		
2.1	71	50		
2.2	72	51	5	5
2.3	73	51		
2.4	74	52		
2.5	75	52		
2.6	76	53	4	4
2.7	77	53		
2.8	78	54		
2.9	79	54		
3.0	80	55	3	3
3.1	81	55		
3.2	82	56		
3.3	83	56		
3.4	84	57	2	2
3.5	85	57		
3.6	86	58		
3.7	87	58		
3.8	88	59	1	1
3.9	89	59		
–4.0	90	60		

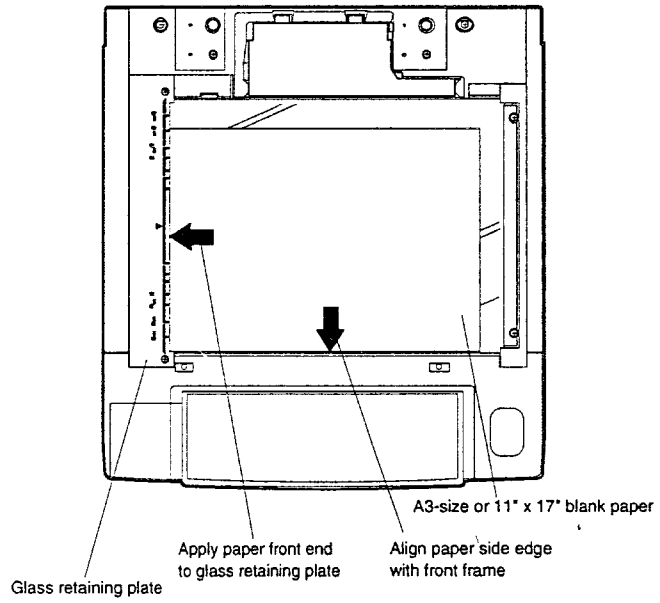
(Lens value input vs. test command input)

(7) Correcting the Vertical skew

Use this procedure when replacing the mirror base driving wire.

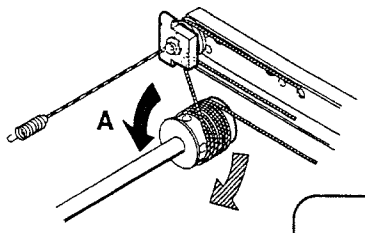


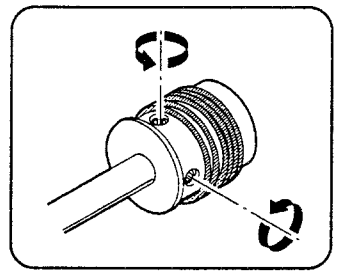
① Set an A3-size or 11" x 17" blank paper on the original table while applying the paper end to the glass retaining plate and aligning the paper side edge with the front frame, as shown in the right figure.
② Use an A3-size or 11" x 17" copy paper to take a full-size copy with the original cover opened.
③ Measure the width of solid at front and rear ends of the copy paper.


A3-size or 11" x 17" blank paper
Glass retaining plate
Apply paper front end to glass retaining plate
Align paper side edge with front frame

If the width of the front end solid (La) is equal to that of the rear end solid (Lb), no adjustment is required.
Otherwise, follow the steps ④ to ⑦ described below:

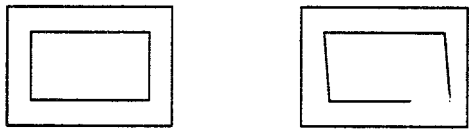
④ Loosen screws securing the mirror base driving pulley on the rear frame side.
If La is bigger than Lb, rotate the mirror base driving pulley on the rear frame side in the A direction. (Do not rotate the flange and the shaft of the mirror base driving pulley).
If La is smaller than Lb, rotate the mirror base driving pulley on the rear frame side in the B direction. (Do not rotate the flange and the shaft of the mirror base driving pulley).
⑤ Tighten the screws securing the mirror base driving pulley.
⑥ Repeat steps ① to ③.
⑦ If La is not equal to Lb, repeat steps ④ and ⑤ until La=Lb.





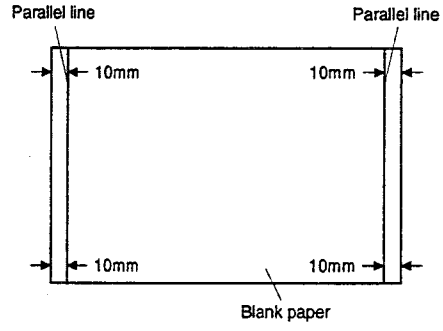
(8) Correcting the Horizontal skew

If the lateral distortion occurs without the longitudinal distortion(distortion in the mirror base scanning direction), the lateral distortion can be corrected by adjusting the height of 2. and 3. mirror base and/or the eccentric roller of 4. and 5. mirror base.
The correction procedure is as follows:

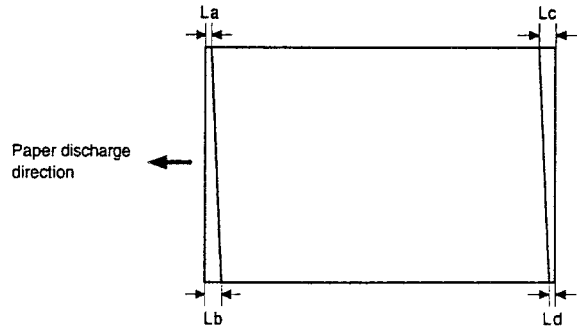


Original Copy

① Preparing the reference original:
On an A3-size or 11" x 17" blank paper, draw 2 parallel lines at the positions 10 mm away from the both ends.



② Take a full-size copy of the paper using an A3-size or 11" x 17" paper.
③ Measure and the distance between the paper end and the line at 4 positions (La, Lb, Lc and Ld).



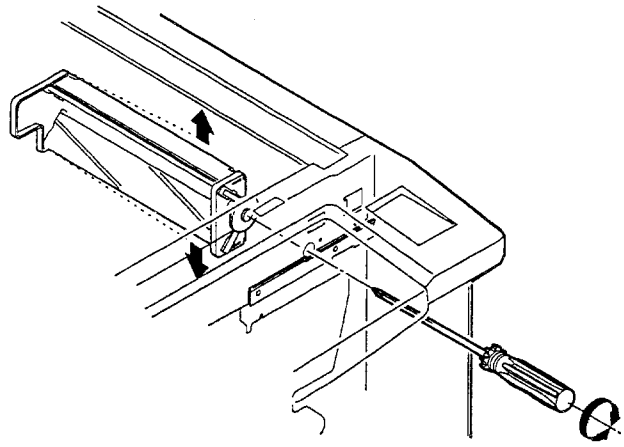
If La=Lb and Lc=Ld, no adjustment is required.
If La>Lb(Lc<Ld), rotate the eccentric roller in one direction to raise the front frame side of the 4. and 5. mirror base unit.
If La<Lb(Lc>Ld), rotate the eccentric roller in the other direction to lower the front frame side of the 4. and 5. mirror base unit.
Note: Remember how much the roller is rotated.
(One rotation of the roller causes the height of the front frame side to change by 2 mm and the difference between La and Lb to change by 4 mm).
* After opening the front cabinet, the adjustment described above can be made through the access hole.
If the above procedure does not provide sufficient adjustment, follow the steps shown below:

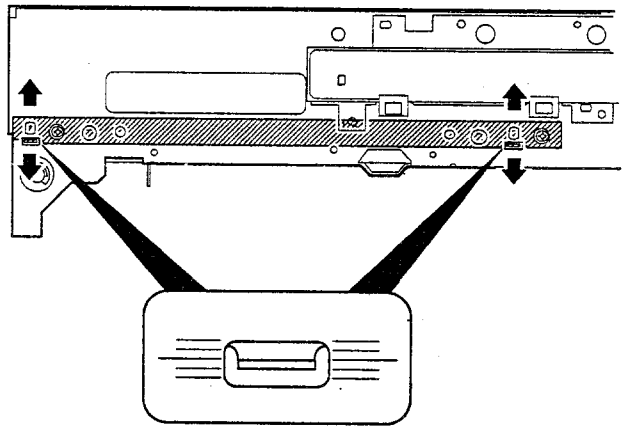
① Move the B rail of the mirror base upward or downward (in the arrow direction).
If La>Lb, raise the mirror base B rail on the paper discharge side by one-half of (La-Lb).
If La<Lb, lower the mirror base B rail on the paper discharge side by one-half of (Lb-La).
ex.:
When La=12 mm and Lb=9 mm, raise the mirror base B rail on the paper discharge side by 1.5 mm.

If Lc>Ld, lower the mirror base B rail on the paper discharge side by one-half of (Lc-Ld).
If Lc<Ld, raise the mirror base B rail on the paper discharge side by one-half of (Ld-Lc).
(Grasping the grip of the mirror base rail, move the mirror base rail).

② Adjust the eccentric roller as described in 1) until La=Lb and Lc=Ld.

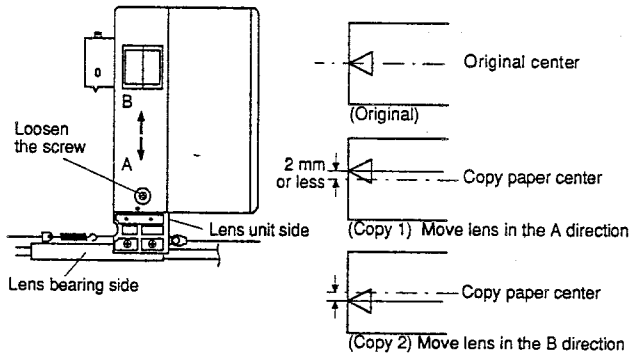
③ After adjustment, manually rotate the mirror base driving pulley to check that the mirror base A and B do not come into contact with each other during full-scanning motion.
Note: If the mirror base rail is moved excessively, the mirror bases may contact with each other.





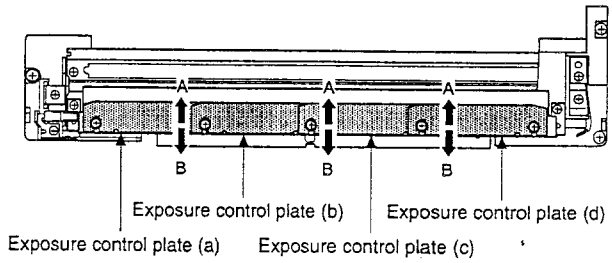
(9) Adjusting the Center Deviation

Take a full-size copy and compare the copy with the original.
If the deviation of the copy center from the original center, move the lens in the arrow direction so that the deviation is 2 mm or less.
Note: After moving the lens, adjust the position of the blank lamp because a change of the reference center position results in a change of the blank lamp position.

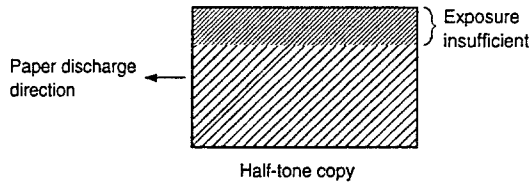


(10) Adjusting the Exposure Balance

Take a half-tone copy, and move the exposure control plate a, b and c to adjust the exposure balance. Movement of the plate in the A direction provides less exposure and the B direction more exposure.



Eg. If the copy is as shown in the figure, move the exposure control plate in the B direction to achieve the exposure balance.



(11) Adjusting the Copy lead edge

Simulation 50-01 or 50-02 allows the copy lead edge adjustment.
(Full-size copy)
Image loss 0 ~ 3 mm (Registration)
Void area 1 ~ 3 mm

(When using Simulation 50-01)

In this simulation, the following keys have special functions:

REDUCE key: This key is used to set the magnification to 50%.

ENLARGE key: This key is used to set the magnification to 200%.

ZOOM-UP key: For each operation of this key, A → b → C → A → are indicated in this order and the copy quantity indicator shows a preset value as follows:

A: Preset value of RRC-A
b: Preset value of RRC-B
C: Preset value of void

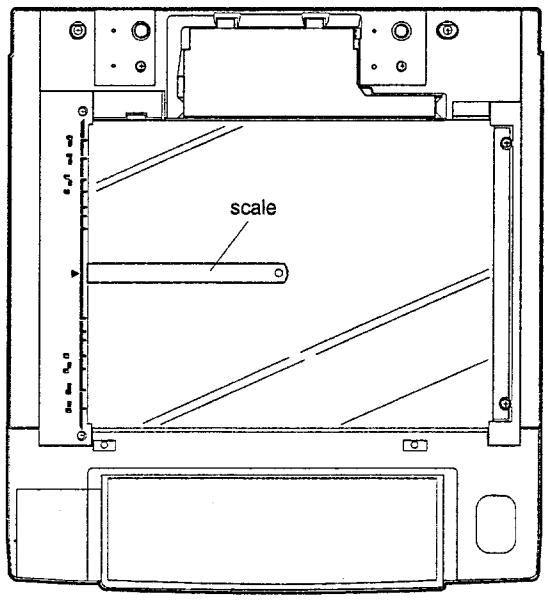
(When pressing the zoom-up key, a preset value currently shown on the copy quantity indicator is stored in memory).

ZOOM-DOWN key:

For each operation of this key, A → C → b → C → A → are indicated in this order and the copy quantity indicator shows a preset value corresponding to a current indication. Other details are the same as those of the zoom-up key.

Display:

During execution of Simulation 50, the copy quantity indicator shows a value of RRC-A and the magnification indicator shows "10A". Upper 2 digits of the value shown on the magnification indicator means a magnification and lower 1 digit "A" means that a value of RRC-A is shown on the copy quantity indicator.



Adjusting Procedure

① Set a scale on the original table.

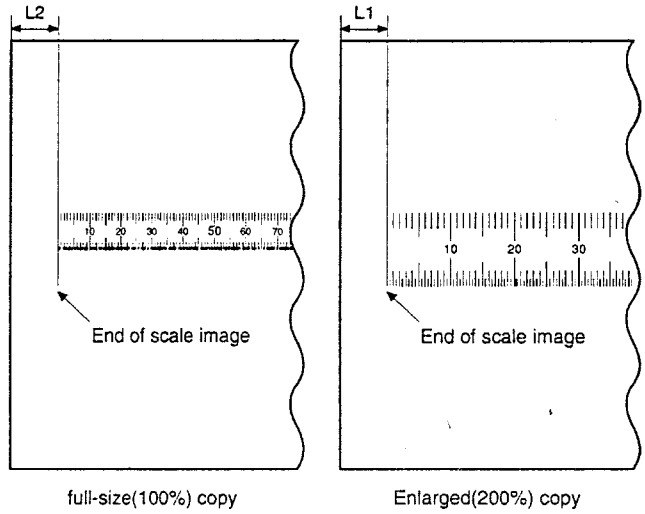
② [C] → [=⌟] → [0/◊] → [=⌟] → [5] → [0/◊] → [PSW] → [1] → [PSW] to perform Simulation 50. When the ready lamp goes on, a preset value (ranging from 1 to 99) is indicated. Content of RRC-A.

③ Set values of both A and B to 0 and take a copy of the scale at magnification of 100% and 200% respectively.

- A full-size(100%) copy can be taken by typing
- [0/◊] → [0/◊] → [ZOOM-UP] → [0/◊] → [0/◊] → [PSW] .
- A enlarged(200%) copy can be taken by typing [ENLARGE] → (After the lens moves, ready lamp ON) → [PSW] .

④ Measure a distance from the paper end to the image (scale) end of each copy, and calculate the values of RRC-A and RRC-B with the following expressions:

If the preset value of RRC-A is not appropriate, the images at the both magnifications differs in end position. RRC-B is a preset value used to control the RRC ON-timing so that the end of the drum image is aligned with the end of a copy paper.



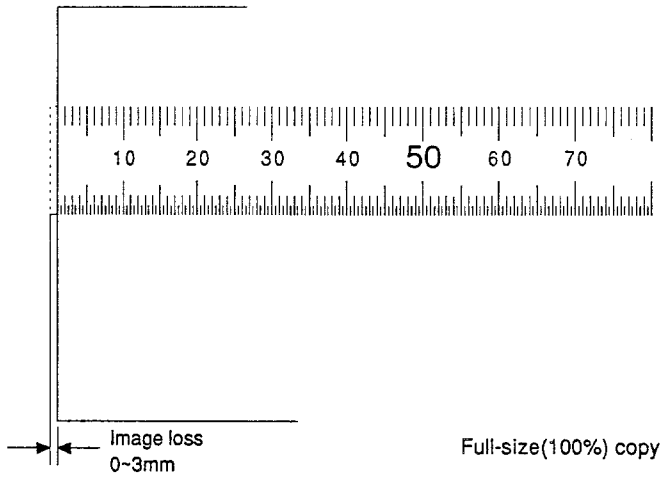
- L1: End deviation at 200% magnification
- L2: End deviation at 100% magnification
- RRC-A = 4.093 x (L1 – L2)
- RRC-B = 10.526 x L2 – 5.263 x L1

⑤ Using ten keys, input the values of RRC-A and RRC-B given by the expressions shown above. For input procedure see 3).

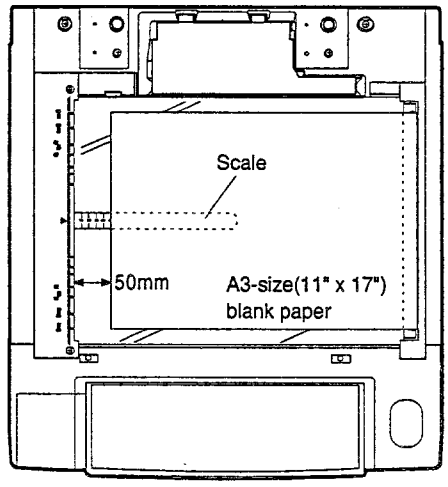
⑥ Take copies at 200%, 100% and 50% magnification and check the deviation difference at each magnification is less than approx. 1 mm.
If the difference is larger than 1 mm, repeat step ③ to ⑥.

⑦ Take a 100% copy to check the image loss for 3 mm or less. If the image loss is larger than 3 mm, change the content of RRC-B so that the range of the image loss is 3 mm or less.

Note: The image loss value adjusted as described above is the image loss value adjusted in Simulation 50-01, and not the final value.

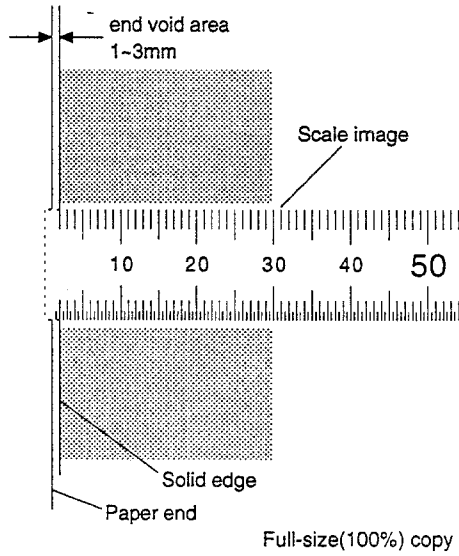


⑧ Set a scale and an A3-size(11" x 17") blank paper on the original table as shown in the figure.



⑨ Operate the zoom key so that the lower 1 digit of the magnification indicator is "C". (Void adjusting mode)

⑩ Take a copy. Type a value for adjusting the end void area of the full-size copy so that, measured with the scale image, the solid edge is 1 ~ 3 mm away from the paper end.
The key operation □ → □ → PSW provide a copy and sets the input value. The input value of "1" corresponds to 0.2 mm in void area. Larger input value provides larger void area.



⑪ Take a full-size copy and check if the image loss and the void area meet the following standards:
(Standard value)
Image loss: 0 - 3 mm
Void area: 1 - 3 mm

⑫ Press the clear key to clear Simulation 50-01.

Note: After changing the RRC-A and RRC-B settings, always adjust the void area of copy end.

(When using Simulation 50-02)

The key and indicator functions in Simulation 50-02 are the same as those in Simulation 50-01.
Simulation 50-02 permits the values of L1 and L2 to be directly input and the end adjustment to be easily performed.

Adjusting Procedure

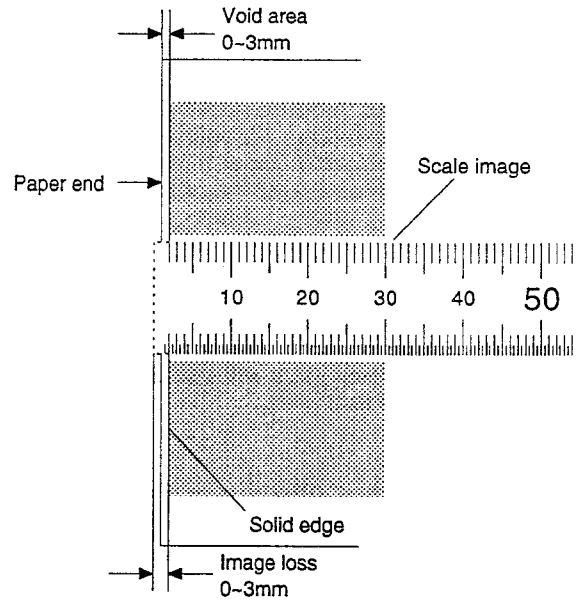
① Set a scale on the original table.

② [C] → [=↵] → [0/◊] → [=↵] → [5] → [0/◊] → [PSW] → [2] → [PSW] to enter the Simulation 50-02 mode.
The machine starts warm-up operation.

③ The copy quantity indicator shows upper 2 digits of 3-digit L1 value and the magnification indicator shows "10A". The upper 2 digits on the magnification indicator means the magnification(100%) and the lower 1 digit "A" means that the value of L1 is indicated on the copy quantity indicator.
- L1: End deviation at 200% magnification (○○○ mm: 3-digit)
- L2: End deviation at 100% magnification (×××mm: 3-digit)

Indication example of copy quantity indicator
42.5 mm → [4] [2] [5] → indicated as [2] [5]

④ Using the zoom key and ten keys, set both A and b values to 0 and take a copy at magnification 100% and 200% respectively.
- An 100% copy can be taken by typing [0/◊] → [0/◊] → [0/◊] → [ZOOM-UP] → [0/◊] → [0/◊] → [0/◊] → [PSW] .
- A 200% copy can be taken by typing [ENLARGE] → (After the lens moves, ready lamp ON) → [PSW] .



Full-size(100%) copy

⑤ Measure the distance from the paper end to image(scale) end of the 200% and 100% copy, and using the zoom key and ten keys, type the L1 and L2 values.
The RRC-A and RRC-B values of Simulation 50-01 are automatically calculated and stored in memory.
Input Procedure
Assuming the L1 is 25.4 mm and L2 is 15.0 mm:
After checking that the lower 1 digit of the magnification indicator is A, [2] → [5] → [4] ("54" indicated on the copy quantity indicator) → [ZOOM-UP] → [1] → [5] → [0] ("50" indicated) → [PSW] .

⑥ Adjust and check the deviation, image loss and void area in the same manner as in case of Simulation 50-01.

4. Adjustment of Copy Density

1. When must the copy density be adjusted ?

- When doing maintenance;
- After adjusting the output current of the main charger and transfer charger, the bias voltage of the separation charger and the grid voltage (After replacing the charger unit and/or the high voltage unit);
- After adjusting the developing bias;
- After replacing parts in the AC PWB unit;
- After replacing the automatic exposure sensor;
- After replacing the copy lamp;
- After replacing the optical unit;
- After disassembling, repairing and/or adjusting the optical unit;
- After moving the exposure control plate;
- After replacing the drum;
- After replacing the main substrate

2. Notes on adjustment of copy density

Before adjusting the copy density, do the followings:

① Clean the optical system(original glass plate, lens, mirror, copy lamp, reflector).

② Clean the automatic exposure sensor (clean the surface of the photosensor with waste soaked with alcohol or water).
(Note: The use of dry waste will cause dust adhesion on the surface of the sensor due to static electricity).

③ Clean the (main, transfer and separation) charger wire and the screen grid.

④ Clean the blank lamp and the separation lamp around the drum holder unit.

⑤ Clean the drum cleaning blade. (After cleaning, always apply powder on the blade).

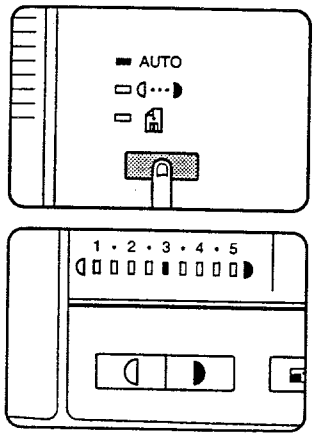
Note: Perform the manual-exposure density adjustment first, and then perform the auto-exposure density adjustment.

Note:
- **This machine automatically performs the correction to the optical system dirt.**
  When Simulation 46-01 is performed, each mode correction is initialized. When performing Simulation 46-01, perform the adjustments of all modes.
- **This machine automatically performs the correction to the sensitivity degrading due to aging of the photo conductor. When Simulation 20 is performed, the correction state is initialized. Simulation 20 should be performed always before Simulation 46-01.**

3. Procedure for copy density adjustment

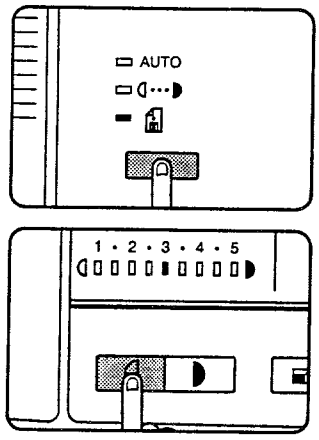
(1) Initial setting of auto-exposure density level (User adjustment)

Enter the auto-exposure copy (AUTO) mode, open the front door and press down the mode exchange key for at least 3 sec. The density level LED is lit. Then set the density to "3" with [LIGHT] and [DARK] keys.



(2) Initial setting of TSM mode (User adjustment)

Enter the PHOTO copy mode, open the front door and press down the mode exchange key for at least 3 sec. The density level LED is lit. Then initial-set the density to the normal mode with [LIGHT] and [DARK] keys.
Density level indicated "3": Normal mode
"1": TSM mode

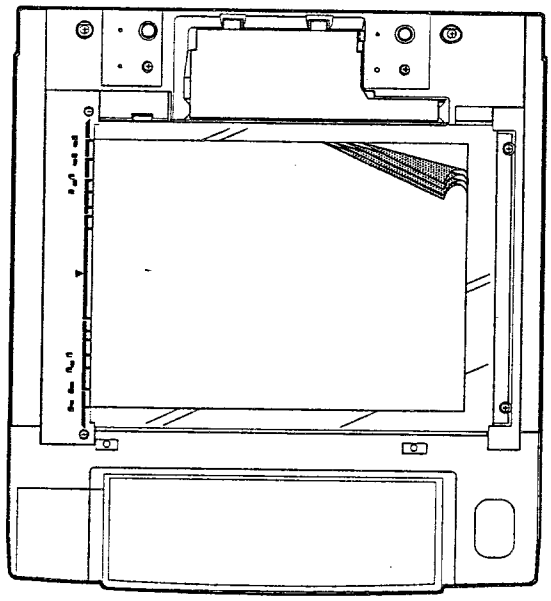


(3) Adjustment of AE sensor level

① Perform Simulation 47. (The mirror base makes scanning motion and stops at AE sensor level measuring position).

② Place four or five A3-size (or 11" x 17") papers one upon another on the original table.

③ Press the print switch again. The copy quantity indicator shows the AE sensor output level for blank paper, which is stored in memory.



(4) Setting of drum sensitivity

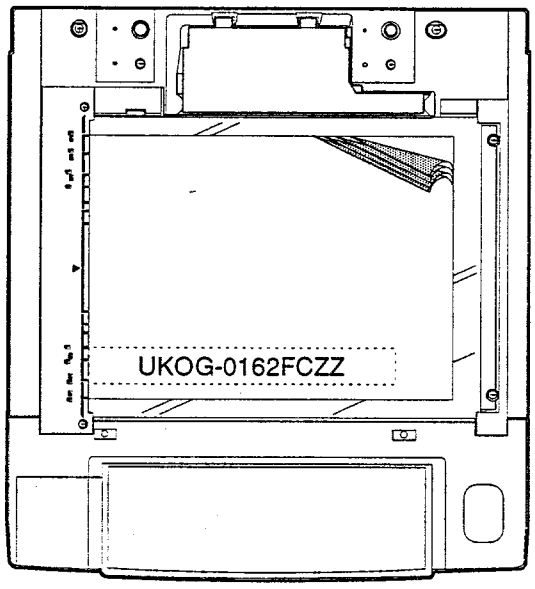
① Perform Simulation 26-07 and check that the first digit of the 4-digit drum number printed on the front-frame sided drum flange is shown on the copy quantity indicator.

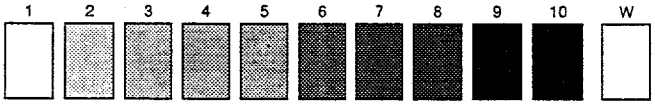
② If the indicated number differs from the drum number, press the copy quantity key to change the setting.

Note: If the setting is done with the copy quantity key, the indicated number is limited to 1, 2 or 3.

(5) Setting of test chart

① Align four or five papers with at least 120 mm in width and approx.420 mm in length one upon another.





② Set the test chart (UKOG-0162FCZZ) on this side of the papers.

UKOG-0162FCZZ DENSITY No.	1	2	3	4	5	6	7	8	9	10	W
UKOG-0089CCZZ DENSITY No.	0.1		0.2		0.3				0.5	1.9	0
KODAK GRAY SCALE		1		2		3		4		19	A

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(6) Adjustment of copy density

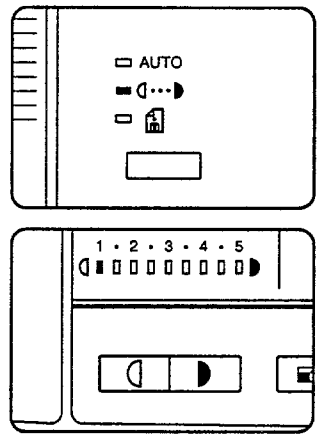
A. Checking the developing bias output
Check that the output value is -215 V when the exposure is set to "1" in the manual exposure mode. Perform Simulation 8-01 for checking the developing bias.

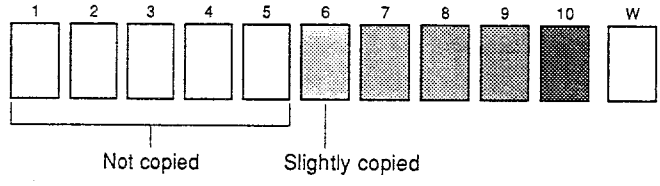
B. Adjusting the density in manual exposure

① Perform Simulation 46-01 for adjusting the copy density.
The exposure indicator of the operation panel shows "1" of the manual copy mode.

② Take a copy.
Check that the "6" of UKOG-0162FCZZ (or 0.5 of UGOG-0089CSZZ) has slightly copied and "5"(0.3) no copied.

<When light> Decrease the value shown on the copy quantity indicator.
<When dark> Increase the value shown on the copy quantity indicator.
* available values : 1-99

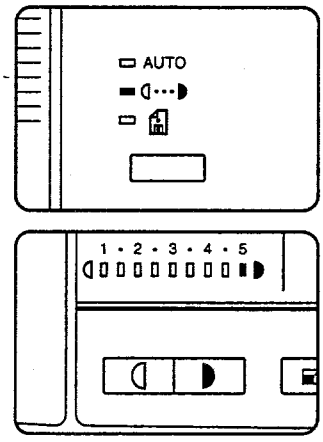


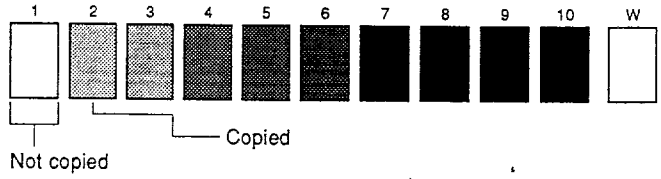


③ When the copy density meets the above requirement, press the exposure key [DARK] so that "5" is shown on the density indicator.

④ Make a copy.
Check that the "2" of UKOG-0162FCZZ (or 0.2 of UGOG-0089CSZZ) has slightly copied and "1"(0.1) no copied.

<When light or dark> See 2).

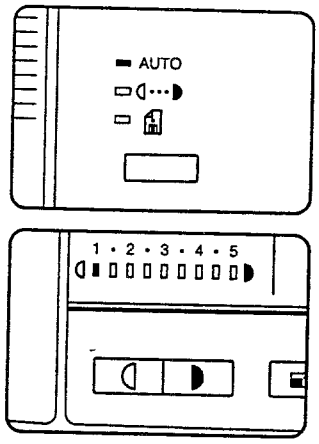




C. Adjusting the TSM mode

① Press the exposure mode exchange key to enter the TSM mode.
On the exposure indicator of the operation panel, MANUAL and PHOTO is simultaneously lit and "1" is shown.

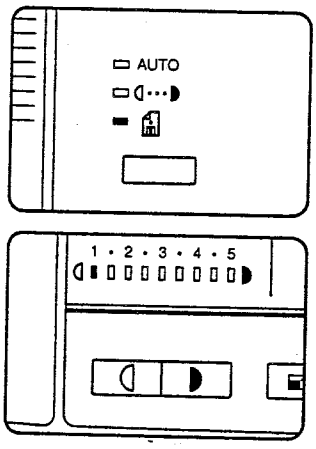
② Use the same procedures as those of B. ② to ④ to adjust the exposure "1" and "5".



D. Adjusting the photo mode

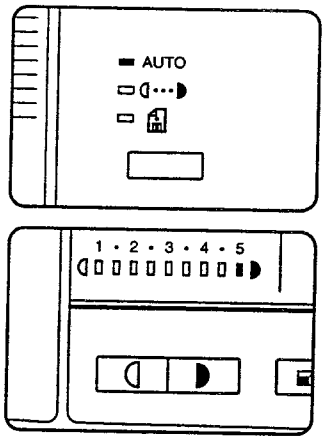
① Press the exposure mode exchange key to enter the photo mode.
The exposure indicator of the operation panel shows "1" of the photo mode.

② Use the same procedures as those of B. ② to ④ to adjust the exposure "1" and "5".



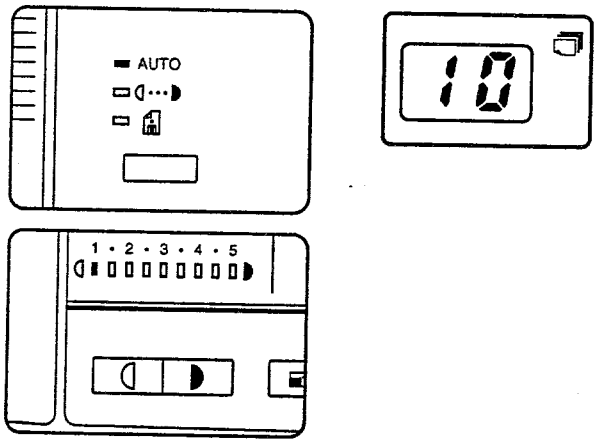
E. Adjusting the auto(normal) mode

① Press the exposure mode exchange key to enter the auto(normal) mode.
The exposure indicator of the operation panel shows "5" of the auto mode.



② Press [LIGHT] key until "1" is indicated.

③ Replace "1" with "10".

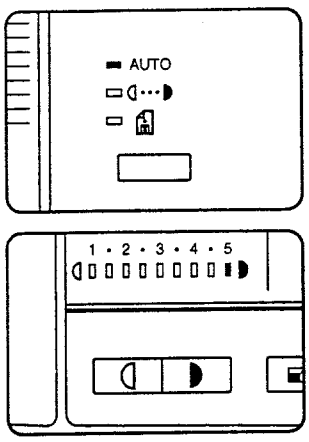


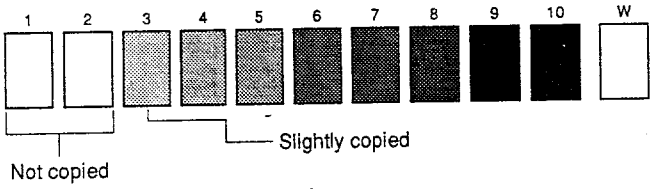
④ Press [DARK] key until "5" is indicated.

⑤ Make a copy.
Check that the "3" of UKOG-0162FCZZ (or 0.2 of UGOG-0089CSZZ) has slightly copied.
If the above condition is not met, readjust as follows:

<When light> Decrease the value shown on the copy quantity indicator.

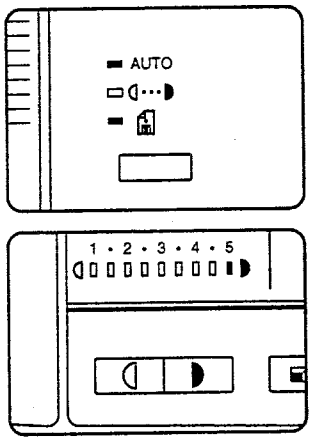
<When dark> Increase the value shown on the copy quantity indicator.





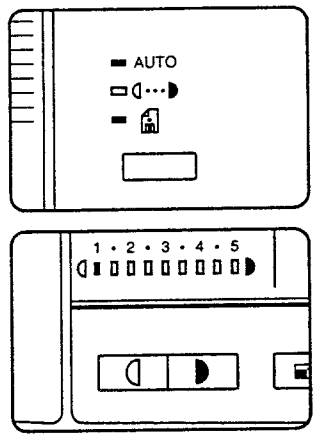
F. Adjusting the auto (toner save) mode

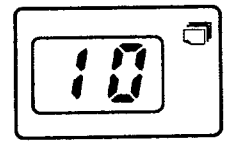
① Press the mode exchange key to enter the auto (toner save) mode.
On the exposure indicator of the operation panel, AUTO and PHOTO is simultaneously lit and "5" is indicated.



② Press [LIGHT] key until "1" is indicated.

③ Replace "1" with "10".





④ Press [DARK] key until "5" is indicated.

⑤ Use the same procedures as those of E. ⑤ to adjust the density.

Procedures for Adjusting the Copy Density

Item	Description
(1) Auto-exposure density level	3 (exposure indication)
(1')Initial setting of TSM mode	3 (normal mode)
(2) Setting of AE sensor characteristics	Perform Simulation 47
(3) Setting of drum sensitivity	Perform Simulation 26-07
(4) Setting of test chart	Test chart comparison table

UKOG-0162FCZZ DENSITY No.	1	2	3	4	5	6	7	8	9	10		W
UKOG-0089CSZZ DENSITY No.	0.1		0.2		0.3				0.5	1.9		0
KODAK GRAY SCALE		1		2		3		4		19		A

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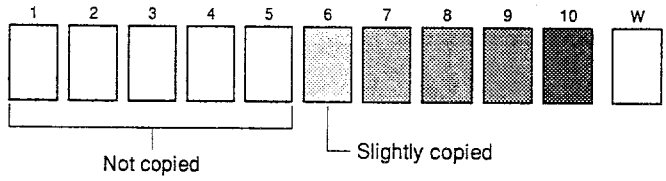
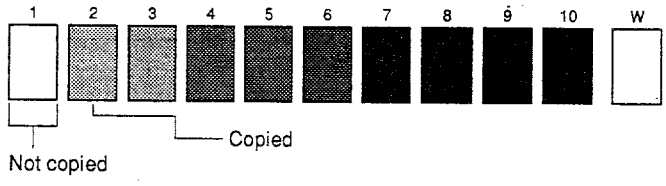
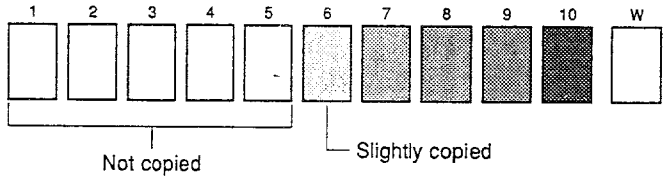
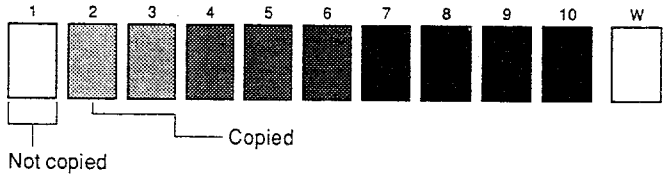
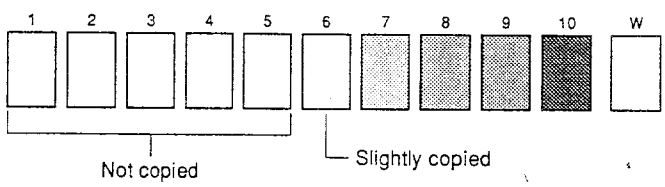
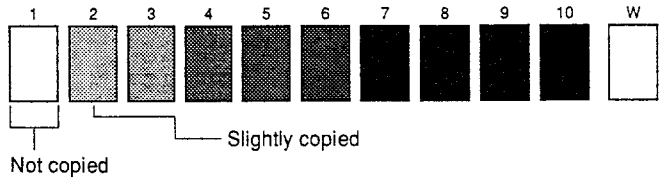
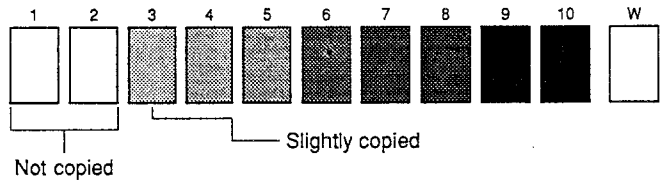
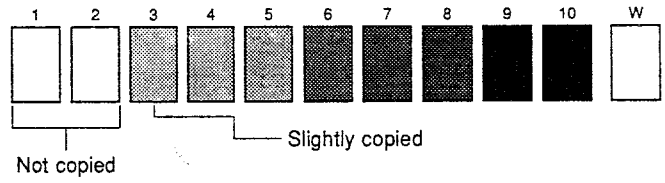
(5) Adjustment of copy density	
A. Adjusting the developing bias output	−215 V (manual exposure 1) Perform Simulation 8-01
B. Adjusting the manual-exposure copy density	Perform Simulation 46-01
Manual exposure 1	
Manual exposure 5	
C. Adjusting the TSM mode	Perform Simulation 46-01 → EXPOSURE.MODE.CHANGE key
Manual/photo exposure 1	
Manual/photo exposure 5	
D. Adjusting the copy density in photo mode	Perform Simulation 46-01 → EXPOSURE.MODE.CHANGE key
Photo exposure 1	

Item	Description
Photo exposure 5	
E. Adjusting the auto-exposure copy density	Perform Simulation 46-01 → EXPOSURE.MODE.CHANGE key Press LIGHT until "1" is indicated, and replace it with "10"
(1) Normal mode Auto exposure 1	
Auto exposure 5	
(2) TSM mode Auto/photo exposure 1	Press LIGHT until "1" is indicated, and replace it with "10"
Auto/photo exposure 2	

[7] Test commands and diagnostics

1. Test command

(1) Introduction

The following can be done with test command.

- Used to operate any functional block independently to check its function.
- Used to adjust the machine.
- Used to set up functions.

(2) Purpose

It allows to help repairing and adjusting the machine using test command.
When the PAUSE key is pressed in a course of test command being executed, the test command is interrupted and the machine becomes ready to accept entry of a test command number.

*1: If the PAUSE key was pressed for more than five minutes, it may not go into the test command mode.

*2: Further operation may be needed depending on the kind of test command.

*3: One of the next methods is required to cancel the test command as it varies according to the test command. The machine then starts from the state immediately after power on.

— Other than test command 7
The test command is canceled when the CLEAR ALL key is pressed.

— Test command 7
One of the following operation cancels the test command execution.

1. Power switch off.
2. Press the CLEAR → PAUSE → 0 → PAUSE → CLEAR ALL keys.

— Test command 14
The test command 14 is used to clear the memory contents (H2, H3, H4) that has been stored in it. After the test command 14 has been executed, the diagnostic is automatically terminates.

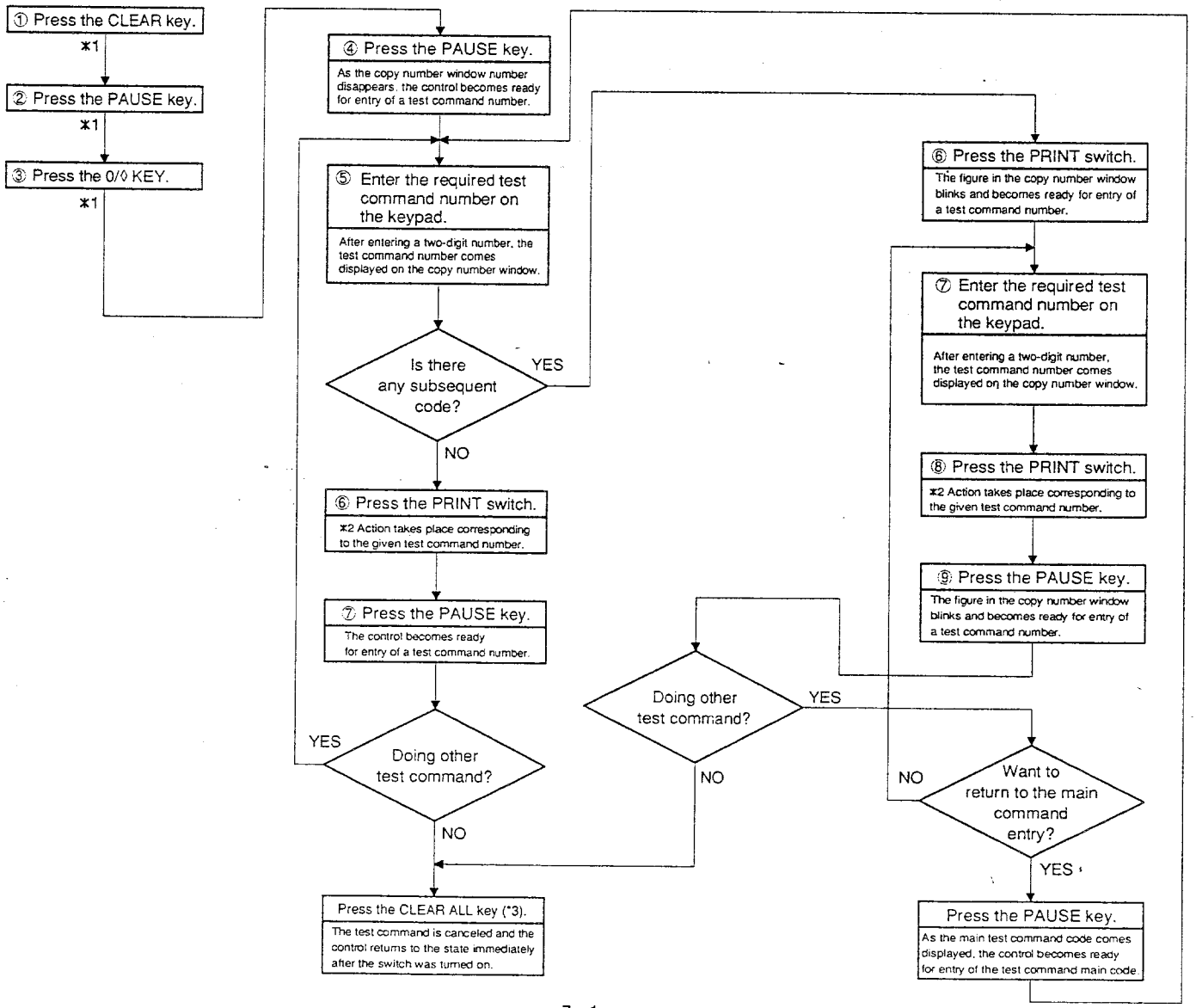
— Special keys
CLEAR ALL key: Test command mode → normal mode.

PAUSE key: Execution of test command is interrupted. Returns to ⑤, if ⑨ when the subsequent is on display.

CLEAR key: Clears the copy number window.

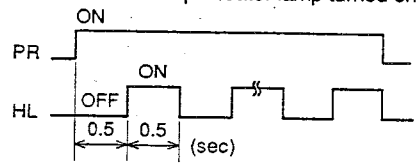
— The diagnostic is automatically terminates after the power switch operation "ON → OFF → ON", except "H", "U2" code.

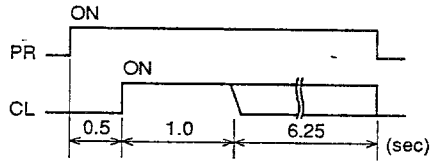
(3) Test command execution procedure


① Press the CLEAR key.
*1
② Press the PAUSE key.
*1
③ Press the 0/◊ KEY.
*1
④ Press the PAUSE key.
As the copy number window number disappears, the control becomes ready for entry of a test command number.
⑤ Enter the required test command number on the keypad.
After entering a two-digit number, the test command number comes displayed on the copy number window.
Is there any subsequent code?
YES
NO
⑥ Press the PRINT switch.
*2 Action takes place corresponding to the given test command number.
⑦ Press the PAUSE key.
The control becomes ready for entry of a test command number.
Doing other test command?
YES
NO
Press the CLEAR ALL key (*3).
The test command is canceled and the control returns to the state immediately after the switch was turned on.
⑥ Press the PRINT switch.
The figure in the copy number window blinks and becomes ready for entry of a test command number.
⑦ Enter the required test command number on the keypad.
After entering a two-digit number, the test command number comes displayed on the copy number window.
⑧ Press the PRINT switch.
*2 Action takes place corresponding to the given test command number.
⑨ Press the PAUSE key.
The figure in the copy number window blinks and becomes ready for entry of a test command number.
Doing other test command?
YES
NO
Want to return to the main command entry?
NO
YES
Press the PAUSE key.
As the main test command code comes displayed, the control becomes ready for entry of the test command main code.

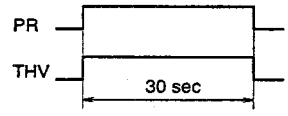
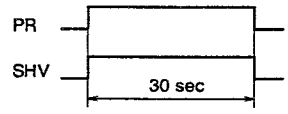
(4) List of test commands

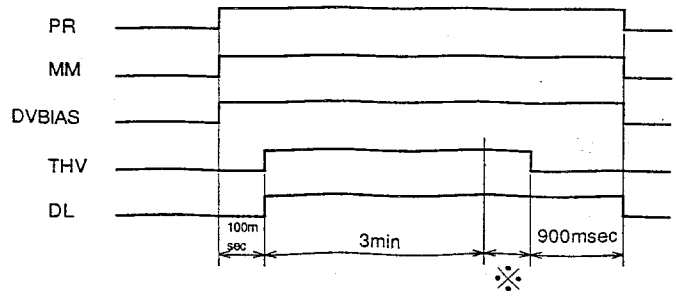
01	01	Optical system mirror operation check
	02	Optical system sensor status display
	03	Lens operation check
	04	Lens aging
05	01	Operation panel display check
	02	Heater lamp lighting check
	03	Copy lamp lighting check
	04	Blank lamp and discharge lamp lighting check
06	02	Separation pawl operation check
07	01	Warm-up time display and aging with jam detection
	02	Warm-up time display and aging without jam detection
	03	Aging ignoring fusing, without jam detection
	04	Warm-up omitting
	06	Intermittent aging with jam detection
	07	Intermittent aging without jam detection
08	01	Developing bias check
	02	MHV (Charger), grid check (Standard mode)
	03	MHV (Charger), grid check (Photo mode)
	04	MHV (Charger), grid check (Toner save mode)
	06	YHV (Transfer charger) check
	07	SHV (Separation charger) check
10	**	Toner motor aging
14	**	Cancel of trouble except or U2
16	**	Cancel of U2 trouble
20	**	Maintenance counter clear
21	01	Maintenance preset counter setting
22	01	Maintenance counter display
	02	Maintenance preset counter display
	03	Jam memory display
	04	Total jam counter display
	05	Total counter display
	06	Developer counter display
	07	Developer preset counter display
24	01	Jam memory/total jam counter clear
25	01	Main motor drive system operation check
	02	Automatic developer adjustment
	03	Previous rotation timer setting
26	03	Timer auto clear, counter mode setting
	06	Destination setting
	07	Photoconductor drum sensitivity setting
	08	Lens focus setting
	09	No.4/5 mirror characteristics setting
	11	Time out clear time setting
30	01	Paper sensor status display
	02	Tray size switch status display
42	**	Developer counter clear
43	**	Fusing temperature setting
46	01	Exposure level adjustment
47	**	AE sensor characteristics measurement
48	01	Front/rear magnification ratio adjustment
48	02	paper transport direction magnification ratio adjustment
50	01	Lead edge image position adjustment
	02	Lead edge image position adjustment (Calculation formula)
51	02	Resist quantity adjustment
	05	Edge erase amount adjustment

<table>
<tr><th>Main code</th><th>Sub code</th><th>Description</th><th>Ref. Page</th></tr>
<tr><td>1</td><td>01</td><td>This is the test command used to test the optical system. The mirror base automatically starts to scan.
(1) With depression of the PAUSE key, the control moves from the test command mode to be ready to execute it. The READY pilot lamp (RPL) comes active with the zoom ratio at 100%. It is possible to change the zoom mode using the ZOOM key.
(2) When the PRINT key is pressed while the RPL is active, the status lamp turns off and the test command starts to execute. The mirror base moves to scan in the zoom ratio at that time.
(3) If the door is opened while the operation is in process, the operation is interrupted with status "CH" prompted. Closing the door will start the operation all over again from its initial step.</td><td></td></tr>
<tr><td></td><td>02</td><td>This is the test command used to test the optical system sensors. When the test command starts, it starts to test the on/off action of a optical system sensor shown by one of the following lamps.
<table>
<tr><th></th><th>Active status lamp</th></tr>
<tr><td>MENTEL (maintenance lamp)</td><td>Mirror rotary encoder pulse (RE) input</td></tr>
<tr><td>DVPL (developer maintenance lamp)</td><td>Lens home position input</td></tr>
<tr><td>TNFL (full waste toner lamp)</td><td>Mirror home position sensor</td></tr>
<tr><td>TPL (toner empty lamp)</td><td>No.4/5 mirror home position sensor</td></tr>
</table></td><td></td></tr>
<tr><td></td><td>03</td><td>Used to test the zoom lens movement.
• The zoom ratio is displayed on the zoom ratio window.
AB series machine 100% → 50% → 70% → 81% → 86% → 115% → 122% → 141% → 200%
Inch series machine 100% → 50% → 64% → 77% → 95% → 121% → 129% → 141% → 200%</td><td></td></tr>
<tr><td></td><td>04</td><td>• Used to test the zoom lens in the aging test mode.
• Test command 1 to 3 are repeated to test.</td><td></td></tr>
<tr><td>5</td><td>01</td><td>All LED's on the operation panel are turned on for five seconds.</td><td></td></tr>
<tr><td></td><td>02</td><td>This is the test command used to test the heater lamp. Heater lamp turned on and off five times.
 

The heater turns on and off in the order shown above.</td><td></td></tr>
<tr><td></td><td>03</td><td>This is the test command used to test the copy lamp. Copy lamp turned on in the following order.
When the test command starts, the copy lamp turns full power for one second with the manual exposure setting 3.0 shown, and the copy lamp intensity can be changed to the power set on the exposure setup key for a period of 6.25 seconds.
 

* Refrain from repeating this test command without waiting for lamp and glass to cool.</td><td></td></tr>
<tr><td></td><td>04</td><td>This is the test command used to check activation of the discharge lamp (DL) and the blank lamps (BL).
• The discharge lamp (DL) turns on for 30 seconds.
• Each blank lamp starts to turn on from the front frame side to the rear frame side. Finally, all blank lamps turn on.</td><td></td></tr>
<tr><td>6</td><td>02</td><td>Separation solenoid ON/OFF
• Used to test the action of the drum separator pawl.</td><td></td></tr>
<tr><td>7</td><td>01</td><td>○ Aging test with alert for paper misfeed
1. Used to check the warmup time.
2. Executes the continuing aging test for the given number of copies.
When the test command is executed. the machine performs its normal action and the warmup time starts to count from zero and increase count every 2 second. The count is displayed on the copy lamp window.
When the RPL is turned on, the addition of the copy number is interrupted with the copy number remaining on display as it is. When the CLEAR ALL key is pressed, the copy number must be entered on the keypad, and with depression of the PRINT switch, the given number of copies repeated to produce. In this case, the paper misfeed function comes alive.</td><td></td></tr>
<tr><td></td><td>02</td><td>○ Aging test without alert for paper misfeed
Aging test is done without feeding paper.
This test command is similar to 7-01. But, it does not alert paper misfeed occurrence. The warmup time check is similar as the test command 7-01.</td><td></td></tr>
</table>

Main code	Sub code	Description	Ref. Page
7	03	° Aging test without misfeed and fusing This test command is similar to 7-01. But, it does not count the warmup time and disregards the heater and paper feed troubles, without activating the heater lamp.	
	04	° Warmup disabled Machine action is checked disregarding the warmup time. When the test command is executed, the RPL immediately turns on. Although the machine action may be tested, it may show the trouble status H4 depending on the case if low heater temperature is found.	
	06	° Intermittent aging test	
	07	° Intermittent aging test without alert for paper misfeed	
8	01	Developing bias voltage output This is the test command used to check the developing bias voltage. The developing bias voltage is turned on for 30 seconds. Standard developing bias setting is –215VDC.	[7]-1(3)
	02	Main (charge) corona output Standard manual exposure mode main corona grid voltage is –730±15V. This is the test command used to check the main corona variance between the front and rear sides. The corona output continues for 30 seconds. • The main corona variance must be within 8μA between the front and the rear.	[7]-4-(3)
	03	Main corona output Photo mode main corona grid voltage is –490±15V.	[7]-2-(3)
	04	Main corona output (Toner save mode) main corona grid voltage is –610V±15V.	[7]-2-(3)
	06	Transfer corona output This is the test command used to check the transfer corona output (THV). The transfer corona output continues for 30 seconds.  Standard transfer corona output is –31±5μA with variance between the front and rear at 8μA, maximum.	[7]-2-(3)
	07	Separation corona output This is the test command used to check the separation corona output (SHV). The separation corona output continues for 30 seconds.  Standard separation corona output is -10 to 10 Vdc.	[7]-2-(3)
10	—	Toner motor activation Used to check the toner motor activation.	
14	—	Trouble cancellation This is the test command used to cancel other than the "U2" trouble (H2, H3, H4). After the trouble has been removed, the test command terminates.	
16	—	U2 trouble cancellation This is the test command used to cancel the "U2" trouble. After the trouble has been removed, the test command terminates.	
20	—	Maintenance counter clear Used to reset the maintenance preset counter to zero after the maintenance is completed. It is mandatory to clear the counter after the maintenance is over.	
21	01	° Maintenance cycle setting Used to set the maintenance cycle. Code Maintenance cycle 0 ····· 80,000 sheets 1 ····· 5,000 sheets 2 ····· 10,000 sheets 3 ····· 20,000 sheets 4 ····· 40,000 sheets 5 ····· None The default is 0. Default is set to 5,000 sheets ("1") of the black copy.	

Main code	Sub code	Description	Ref. Page
22	01	∘ Maintenance counter display Copy number of the maintenance counter is displayed. The contents of the counter is displayed on the copy number window in three segments, each segment consisting of a two-digit number. □□ → Blank → □□ → Blank → □□ → A long Blank	
	02	∘ Maintenance preset counter display This test command is used to check the contents of the maintenance preset counter. It is displayed in the same way as the test command 22-01.	
	03	∘ Paper misfeed map display	
	04	∘ Total misfeed counter display	
	05	∘ Total counter display This counter is used to show the total copy number of the machine. • It is displayed in the same way as the test command 22-01.	
	06	∘ Developer counter display The contents of the copy number counter of the installed developing unit is displayed. • It is displayed in the same way as the test command 22-01. • The color of the developing unit is displayed by a combination of the maintenance lamp (MENTEL), full waste toner lamp (TNFL), and the developer maintenance lamp (DVPL), while the developing unit is operating. Color / TNFL / DVPL / MENTEL: Black / O / × / × O ··· ON × ··· OFF	
	07	∘ Developer preset counter display Number of developer replacements and the reset counter contents of the installed developing unit are displayed. • It is displayed in the same way as the test command 22-01. • Color of the installed developing unit is the same as the test command 22-06.	
25	01	Main motor activation • Used to check malfunction in the main motor drive train. • Also, monitors the toner density sensor. (Procedure) Monitors the toner sensor of the black developing unit. (To check the sensor) C → =J → 0 → =J → 2 → 5 → PSW → 1 → PSW	
	02	Automatic developer referance setting • This is the test command used to monitor the toner sensor and to automatically adjust the developer. • For the automatic developer adjustment, the developing tank is stirred and the toner sensor output is monitored. The sensor is monitored for 16 times in 2 minutes after the stirring started and their mean value is stored in the memory as the toner density adjust value. (See the area marked with an asterisk in the figure below.) Afterwards, referance changes as copies are made to maintain density.  (Procedure) C → =J → 0 → =J → 2 → 5 → PSW → 2 → PSW	
	03	Previous rotation timer setting Can be set to 0 ~ 99 sec. Power ON → Warm-up →→ Previous rotation (2 sec) ATC output check → Ready lamp ON ↓ ↑ Execution of previous rotation based on the set time ignoring toner control	

<table>
<tr><th>Main code</th><th>Sub code</th><th>Description</th><th>Ref. Page</th></tr>
<tr><td>26</td><td>03</td><td>Timer auto clear (yes/no) and counter mode setup
① When the test command is executed, the code of the presently stored mode is displayed with the READY lamp turned on.
② After the READY lamp has turned on, enter an appropriate setup code on the keypad and press the PRINT switch. Then, the code is stored in the memory and the READY lamp turns off.
<table>
<tr><th>Setup code</th><th>Timer auto clear</th><th>Total counter (single/double count)</th><th>Maintenance counter (single/double count)</th></tr>
<tr><td>0</td><td>O</td><td>Double count</td><td>Double count</td></tr>
<tr><td>1</td><td>O</td><td>Single count</td><td>Double count</td></tr>
<tr><td>2</td><td>O</td><td>Double count</td><td>Single count</td></tr>
<tr><td>3</td><td>O</td><td>Single count</td><td>Single count</td></tr>
<tr><td>40</td><td>×</td><td>Double count</td><td>Double count</td></tr>
<tr><td>41</td><td>×</td><td>Single count</td><td>Double count</td></tr>
<tr><td>42</td><td>×</td><td>Double count</td><td>Single count</td></tr>
<tr><td>43</td><td>×</td><td>Single count</td><td>Single count</td></tr>
</table></td><td></td></tr>
<tr><td></td><td>06</td><td>Destination setup
Used to set the model number and destination.
① When the test command is executed, the presently stored model number and the destination code are displayed (see table below) and the READY lamp turns on.
② After the READY lamp has turned on, enter the model number and the destination code on the keypad and press the PRINT switch to store the setting in the memory. The READY lamp then turns off.
<table>
<tr><th>Destination</th><th>U.K. (SUK)</th><th>Export AB series machine except U.K.</th><th>U.S.A. (SEC)</th><th>Inch series machine except U.S.A.</th></tr>
<tr><td>Set value</td><td>1</td><td>5</td><td>6</td><td>7</td></tr>
</table></td><td></td></tr>
<tr><td></td><td>07</td><td>Drum sensitivity setup
① When the test command is executed, the number stored in the memory is recalled and the READY lamp turns on.
② A number 1 to 3 may be entered on the keypad while the RPL is active.
③ Press the PRINT switch after the number has been entered. With this, the READY lamp turns off and the test command number is displayed. Now, this is all needed for the setup.
° Drum
<table>
<tr><td>Keypad entry</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>Sensitivity</td><td>1</td><td>2</td><td>3</td></tr>
</table>
Input of the zoom position shift correction value (26-08, 26-09)</td><td></td></tr>
<tr><td></td><td>08</td><td>Lens characteristics entry (at a time of lens replacement)
For each lens has a variance in its focal distance, the lens moving distance in any zoom mode must correspond with the focal distance of the lens. The zoom ratio varies proportionate to the variance of the lens focal distance.
To avoid problem, the class of the lens focal distance refer to chart next) is stored in the memory using the test command. In a variable zoom mode, the lens moving distance that corresponds to the lens focal distance is obtained on the basis of the data so as to produce the accurate zoom copy.
Setup method (26-08)
① When the test command is executed, the presently stored preset code is displayed and the READY lamp turns on.
② After the READY lamp turned on, enter the lens number shown on the lens upper area and press the PRINT switch to store the preset value in the memory. The READY lamp now turns off.
[C] → [=J] → [0/◊] → [÷J] → [2] → [6] → [PSW] → [8] → [PSW] → [1] → [4] → [PSW] (Setting)</td><td>[7]-3-(6)</td></tr>
</table>

Main code	Sub code	Description	Ref. Page
26	09	4/5 mirror characteristics entry (at a time of lens replacement) (Setup method (26-09) ① Set the correction value for lens marked value based on "lens value vs. test command input." Press [C] → [=↵] → [0/◊] → [=↵] → [2] → [6] → [PSW] → [9] → [PSW] keys to execute the test command 26-09. As the READY lamp turns on, the previously set value 1 to 21) is shown. ② Enter the new value on the keypad. EX: If the value shown on the lens is +1, 2, pick up "14." Press the [1] → [4] → [PSW] keys. A figure 0 to L is shown on the lens value label.	[7]-3-(6)

(Label)

82525
No. 114191
O-L
+1.2

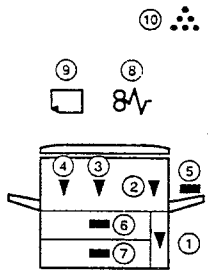
Value shown on the label (O – L)	Test command 48-01	Test command 48-01 [=↵]	Test command 26-09 Zoom correction (No.4/5 mirror)	Test command 26-08 Zoom correction (lens)
+4.0	10	20	21	21
3.9	11	21		
3.8	12	22		
3.7	13	22	20	20
3.6	14	22		
3.5	15	23		
3.4	16	23		
3.3	17	24	19	19
3.2	18	24		
3.1	19	25		
3.0	20	25		
2.9	21	26	18	18
2.8	22	26		
2.7	23	27		
2.6	24	27		
2.5	25	28	17	17
2.4	26	28		
2.3	27	29		
2.2	28	29		
2.1	29	30	16	16
2.0	30	30		
1.9	31	31		
1.8	32	31		
1.7	33	32	15	15
1.6	34	32		
1.5	35	33		
1.4	36	33		
1.3	37	34	14	14
1.2	38	34		
1.1	39	35		
1.0	40	35		

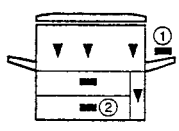
Main code	Sub code	Description	Ref. Page

09

Value shown on the label (O – L)	Test command 48-01	Test command 48-01 =↵	Test command 26-09 Zoom correction (No.4/5 mirror)	Test command 26-08 Zoom correction (lens)
0.9	41	36	13	13
0.8	42	36		
0.7	43	37		
0.6	44	37		
0.5	45	38	12	12
0.4	46	38		
0.3	47	39		
0.2	48	39		
+0.1	49	40	11	11
0	50	40		
–0.1	51	40		
0.2	52	41	10	10
0.3	53	41		
0.4	54	42		
0.5	55	42		
0.6	56	43	9	9
0.7	57	43		
0.8	58	44		
0.9	59	44		
1.0	60	45	8	8
1.1	61	45		
1.2	62	46		
1.3	63	46		
1.4	64	47	7	7
1.5	65	47		
1.6	66	48		
1.7	67	48		
1.8	68	49	6	6
1.9	69	49		
2.0	70	50		
2.1	71	50		
2.2	72	51	5	5
2.3	73	51		
2.4	74	52		
2.5	75	52		
2.6	76	53	4	4
2.7	77	53		
2.8	78	54		
2.9	79	54		
3.0	80	55	3	3
3.1	81	55		
3.2	82	56		
3.3	83	56		
3.4	84	57	2	2
3.5	85	57		
3.6	86	58		
3.7	87	58		
3.8	88	59	1	1
3.9	89	59		
–4.0	90	60		

(Lens value input vs. test command input)

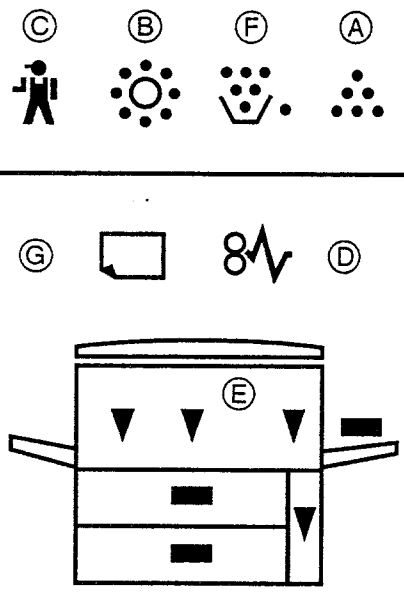
<table>
<tr><th>Main code</th><th>Sub code</th><th>Description</th><th>Ref. Page</th></tr>
<tr><td>26</td><td>11</td><td>Time out clear period setup
Possible to set between 1 and 99 seconds (default at 60 seconds).</td><td></td></tr>
<tr><td>30</td><td>01</td><td>Monitoring main unit paper sensor
Used to check the on/off state of paper sensor within the copier using the misfeed lamp and the paper feed location lamp.
 
<table>
<tr><th>Location Marking</th><th>Sensor</th></tr>
<tr><td>① JL2</td><td>PPD1</td></tr>
<tr><td>② JL3</td><td>PPD2</td></tr>
<tr><td>③ JL4</td><td>PSD</td></tr>
<tr><td>④ JL5</td><td>POD</td></tr>
<tr><td>⑤ CSL1</td><td>PED1</td></tr>
<tr><td>⑥ CSL2</td><td>PED2</td></tr>
<tr><td>⑦ CSL3</td><td>PED3</td></tr>
<tr><td>⑧ JPL</td><td>LUD1</td></tr>
<tr><td>⑨ PPL</td><td>LUD2</td></tr>
<tr><td>⑩ TPL</td><td>PID</td></tr>
</table></td><td></td></tr>
<tr><td></td><td>02</td><td>Monitoring paper tray size
Used to check the on/off state of paper tray size.
<table>
<tr><th>Position \ Tray</th><th>Tray feed</th></tr>
<tr><td>TPL (toner empty lamp)</td><td>CSSW1</td></tr>
<tr><td>TNFL (full waste toner lamp)</td><td>CSSW2</td></tr>
<tr><td>DVPL (developer maintenance lamp)</td><td>CSSW3</td></tr>
<tr><td>MENTEL (maintenance lamp)</td><td>CSSW4</td></tr>
</table></td><td></td></tr>
<tr><td>42</td><td>*</td><td>° Developer counter clear
Reset the contents of the copy number counter of the installed developing unit.
• The counter contents displayed in the same manner as the test command 22-01.
• The color of the installed developing unit is similar as the test command 22-06.
NOTE: If the developing unit has not been installed or if the developing unit is not black, the test command would not operate.</td><td></td></tr>
<tr><td>43</td><td>*</td><td>° Fuser temperature setup
Used to set the fuser temperature.
When the test command is executed, the low two digits of the currently programmed fuser temperature is shown (ex: 75=175°C). When the tray select key is pressed here, the fuser temperature setting can be changed in increments of 5°C. Press the PRINT switch to set.
90 → 85 → 95 → 00 → 05</td><td></td></tr>
<tr><td>46</td><td>01</td><td>° Exposure level adjustment
Used to adjust the copy density and the copy density select level.</td><td>[7]-5-(5)</td></tr>
<tr><td>47</td><td>*</td><td>° AE sensor characteristics measurement
AE sensor output characteristics memory
(1) AE sensor output characteristics input
Press the [C] → [=J] → [0] → [=J] → [4] → [7] → [PSW] keys. The mirror base is initialized, scans about 10cm, then stops.
The READY lamp turns on now and becomes ready to measure.
Press the PRINT switch. The copy lamp driving voltage changes in increments of 5V (10V) each from 80V (160V) to 55V (110V), and the AE sensor output characteristics is stored in the memory against copy intensity variation for the original.
NOTE: Shown in parenthesis is for the 200V series machine.</td><td>[7]-5-(2)</td></tr>
</table>

Main code	Sub code	Description	Ref. Page
48	01	Front/rear direction zoom ratio adjustment (refer to the test command 26-9 for the lens type value. Used to set the No.4/5 mirror home position (focal adjustment) and to adjust the zoom ratio of the copy in the vertical direction (from front to rear). There are two kinds of test command 48-01 of which procedure are described as follows. 1-1. Vertical copy zoom ratio standard value input method (at a time the lens or main PWB replacement0 Press the [C] → [=J] → [0] → [=J] → [4] → [8] → [PSW] → [=J] keys. The already set value or "40" is displayed on the copy number window. Substitute the value of "O.L" shown on the label attached to the lens with the next formula to obtain the value. 40 – [(value of O – L) x 5] = standard value of correction Ex: 40 – (+1.2 x 5) = 34 1-2. Use this test command to adjust the horizontal zoom ratio. Change the value entered in "1-1" to change. 2-1. No.4/4 mirror home position standard value input (at a time of lens or main PWB replacement). Press the [C] → [=J] → [0] → [=J] → [4] → [8] → [PSW] [1] → [PSW] keys. The already stored value or "50" is displayed. Substitute the value of "O.L" shown on the label attached to the lens with the next formula to obtain the value. 50 – [(O – L value) x 10] = standard value of correction Ex: 50 – (+1.2 x 10) = 38 2-2. To adjust the resolution, change the value entered at "2-1" using this test command. (Label) 82525 No. 114191 O-L +1.2	[7]-3-(1) -(3) [7]-3-(2) -(4)
	02	° Paper moving direction zoom adjustment Used to adjust the zoom ratio in the landscape mode. Varying the mirror base moving speed adjusts the zoom factor in the landscape direction of the copy (paper moving direction). Adjusting method ① Place a scale over the original table in the direction the paper moves. Make a copy in the 100% zoom mode and obtain the copy zoom ratio correction factor. Copy zoom correction factor = (original size) – $\frac{\text{(copy image size)}}{\text{(original size)}} \times 100\%$ ② Do the test command 48-02. As the READY lamp turns on, the previously set figure between 5 and 35 is displayed. Change it with the copy zoom factor correction factor obtained in ①. (Input value) = (previously stored value) + copy zoom ratio correction factor [%] × 10 Press the PRINT switch after entering the input value. With this, the input value is stored in the memory and the READY lamp turns off.	[7]-3-(5)
50	1	Used to adjust the copy lead edge image loss and void areas. For more information, refer to the optical system copy lead edge adjustment procedure.	[7]-3-(11)
	2	The function of this test command is similar to the test command 50-01. The test command 50-02 allows easier lead edge adjustment using the values of L1 and L2. For more information, refer to the optical system copy lead edge adjustment procedure.	[7]-3-(11)
51	02	° Resist roller adjustments Used to set the on timing of the paper feed roller (rate of buckle in the paper caused by the resist roller). When the test command is executed, the manual feed mode is automatically established. Change the manual feed mode resisting rate, and tray paper feed resist rate, and ADU paper feed resist rate.  Press the [C] → [=J] → [0/◊] → [=J] → [5] → [1] → [PSW] → [2] → [PSW] → keys. The lower tray lamp turns on → ② Enter number → press the tray key (the manual feed lamp turns on) → ① enter number → press the tray key (main unit bottom tray lamp turns on) → ③ enter number → press the tray key. ①: Manual feed paper resist rate adjustment ②: Tray paper resist rate adjustment	[7]-2-(2)
	05	° Frame delete rate adjustment (copy moving direction only) Used to set the frame delete rate. • When the test command is executed, the READY lamp turns on, and the figure previously stored is displayed on the copy number window. Now, it becomes ready to accept a number between 1 and 19 on the keypad. When the PRINT switch is pressed after the entry, the number is stored in the memory and the READY lamp turns off. A single rate deletes the frame of about 1.0mm. The standard value has been set to "6."	[7]-2-(2)

2. Diagnostics (Trouble status display)

Trouble status code	Subordinate code	Description
L4	01	Main lock detection
L5	03	No.4/5 mirror motor error detection
	04	No.4/5 mirror motor MHPS error detection
	05	Lens motor error detection
	06	Lens motor LHPS error detection
L8	01	Power supply line frequency error detection
	03	AE sensor abnormality
H2		Open thermistor
H3		Heat roller high temperature detection
H4		Heat roller low temperature detection
U2		Counter sumcheck error detection
U3	20	Mirror motor lock detection
	21	Mirror motor MHPS error detection
EE	EL	Auto developer adjustment (overtoned)
	EU	Auto developer adjustment (undertoned)
F2	02	Toner motor malfunction detected
F3	12	Main unit upper tray liftup motor trouble detected
	22	Main unit bottom tray liftup motor trouble detected

3. Alarm display



Alarm		Content	ON	Blink	Remark
Ⓐ	Toner empty	Toner empty in the developer unit is detected.	Red		Max. 180 copies can be made from lighting. Then the lamp blinks to stop the machine.
				Red	
Ⓑ	Developer	The developer life is reached.	Red (80K)		
Ⓒ	Maintenance	When reaching the maintenance timing (80K)	Red		Can be changed to 5K/10K/20K/40K. (Servicing simulation)
Ⓓ	Paper jam	A paper jam occurs.		Red	
Ⓔ	Jam position display	The jam position is displayed.		Red	
Ⓕ	Collected toner overflow	Collected toner full is detected.		Red	
Ⓖ	Paper empty	There is no paper in the selected tray. No paper at all the paper feed ports.	Red		

[8] Maintenance and Miscellaneous

1. Maintenance Schedule

SF-1025 : every 80,000 sheets of paper
<Remarks>
★ = lubrication ○ = cleaning △ = adjustment ▲ = replacement/mounting □ = repositioning × = check(cleaning, replacement and/or adjustment, if necessary)

Section	Part	Timing						
		Installation	Service call	80K	160K	240K	320K	Notes
Developing section	Developer (black)	▲		▲	▲	▲	▲	
	Toner	▲						
	Developer							
	DV seal				▲		▲	
Around the drum	Drum	(▲)		▲	▲	▲	▲	
	Blade			▲	▲	▲	▲	
	Toner receiving seal			×	▲	×	▲	
	Separating claw			▲	▲	▲	▲	
	Electrostatic charge plate unit			▲	▲	▲	▲	
	MC case		○	○	○	○	○	
	Screen grid		○ (×)	▲	▲	▲	▲	
	TC wire		○ (×)	▲	▲	▲	▲	
	TC case		○	○	○	○	○	
	BL/DL lamp		○	○	○	○	○	
	Run-down toner bottle							Every 20K by the user.
Suction section	Suction belt		○ (×)	○	○	○	○	
	Ozone filter			▲	▲	▲	▲	
Fusing section	Upper heat roller			○	▲	○	▲	
	Gear for upper heat roller			★	▲	★	▲	
	Lower heat roller			○	▲	○	▲	
	Upper separating claw			▲	▲	▲	▲	
	Lower separating claw			▲	▲	▲	▲	
	Upper cleaning roller	▲		▲	▲	▲	▲	
	Thermistor			○	○	○	○	
	Various gearing			★	★	★	★	
Optical section	Mirror/lens/reflector/filter		○	○	○	○	○	
	Driving wire			×	×	×	×	
	Optical rail			★	★	★	★	
	Sensing devices		○	○	○	○	○	
	Original glass plate/original cover	○	○	○	○	○		
Paper feeding section	Various rollers (manual feed, 500-sheet tray)		○	○	○	○	○	
	Torque limiter (manual feed, 500-sheet tray)		×	×	×	×	×	
	500-Sheet tray brake spring (paper feed unit)		○	○	○	○	○	
Other	Paper transport section paper guide		○	○	○	○	○	
	Gear section (Each drive section)		★	★	★	★	★	
Picture quality			×	×	×	×		

2. Counters and Simulations Related to Maintenance

(1) List of counters and simulations related to maintenance

<table>
<tr><th rowspan="2">Function</th><th colspan="2">Simulation</th><th>Description</th></tr>
<tr><th>Main code</th><th>Sub code</th><th></th></tr>
<tr><td>Clear the maintenance counter</td><td>20</td><td>*</td><td>The contents of the preset counter are cleared to zero.</td></tr>
<tr><td>Set the maintenance cycle</td><td>21</td><td>1</td><td>Code Maintenance cycle
0 ..... 80,000 sheets
1 5,000
2 10,000
3 20,000
4 ..... 40,000 sheets
5 ..... None</td></tr>
<tr><td>Display the maintenance count</td><td rowspan="7">22</td><td>1</td><td>The copy quantity stored in the maintenance counter is displayed.</td></tr>
<tr><td>Display the maintenance preset count</td><td>2</td><td>The contents of the preset counter are displayed.</td></tr>
<tr><td>Display the jam map</td><td>3</td><td></td></tr>
<tr><td>Display the total jam count</td><td>4</td><td></td></tr>
<tr><td>Display the total count</td><td>5</td><td>The total copy quantity is displayed.</td></tr>
<tr><td>Display the developer count</td><td>6</td><td>The number of sheets copied using the currently mounted developing unit is displayed.
<table><tr><th>Color</th><th>TNFL</th><th>DVPL</th><th>MENTEL</th></tr><tr><td>black</td><td>O</td><td>X</td><td>X</td></tr></table>O: ON
X: OFF</td></tr>
<tr><td>Display the developer preset count</td><td>7</td><td>The contents of the developer exchange quantity preset counter are displayed.</td></tr>
<tr><td>Clear the jam memory and total jam counter</td><td>24</td><td>1</td><td>The contents of the jam memory and total jam counter are cleared to zero.</td></tr>
<tr><td>Developer</td><td>42</td><td>*</td><td>The contents of the developer counter are cleared to zero.</td></tr>
</table>

(2) Maintenance Indication

①	Toner empty	Black toner empty is detected and displayed.
②	Developer	Black developer lifeover is displayed.
③	Waste toner bottle full	No space in the waste toner bottle is indicated.
④	Maintenance	According to the cycle specified in Simulation, required maintenance is indicated.

(3) Setting the copy counter mode

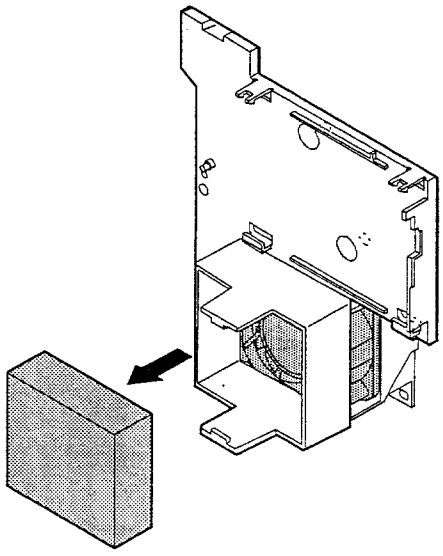
Simulation		Setting code	Auto-clear available	Maintenance counter	Total counter
Main	Sub				
26	03	0	○	double count	double count
		1	○	double count	single count
		2	○	single count	double count
		3	○	single count	single count
		40	×	double count	double count
		41	×	double count	single count
		42	×	single count	double count
		43	×	single count	single count

*1 The double/single count is limited to apply to Ã3-size paper.
*2 Code other than those given in the above table is invalid or may cause operation error.

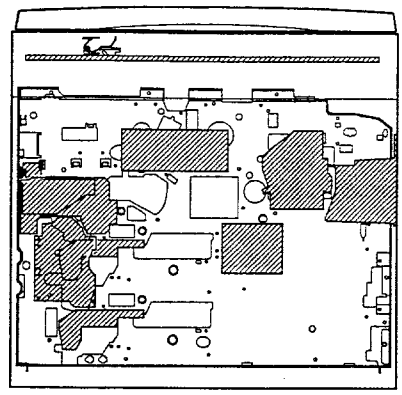
3. Replacing the Ozone Filter

The purpose of the ozone filter is to suppress emitting ozone from the machine, which is generated during corona discharge in the charger units. In order to maintain this effect, the ozone filter requires to be replaced ev , 80,000 sheets of copy paper.

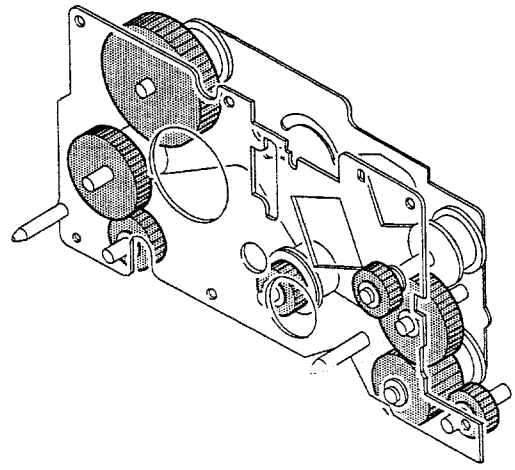
(1) Replacing the suction ozone filter



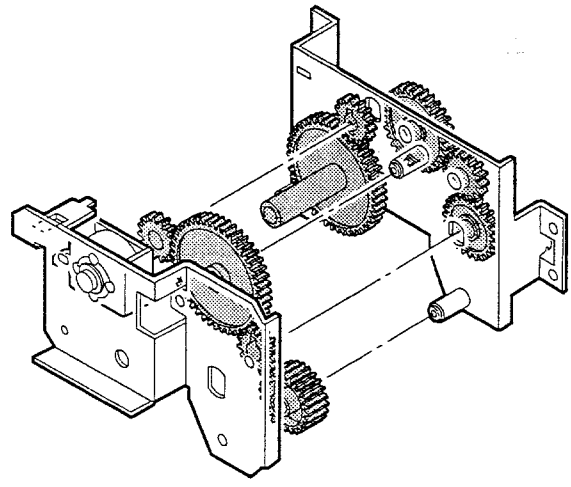
4. Oil/Grease Points



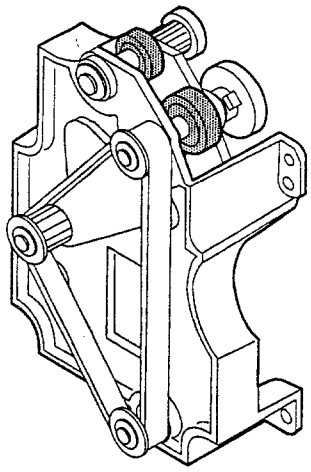
(1) Gear of main driving unit



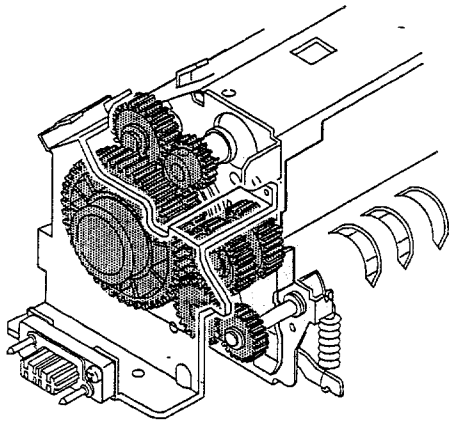
(2) Gear of paper-feed clutch unit



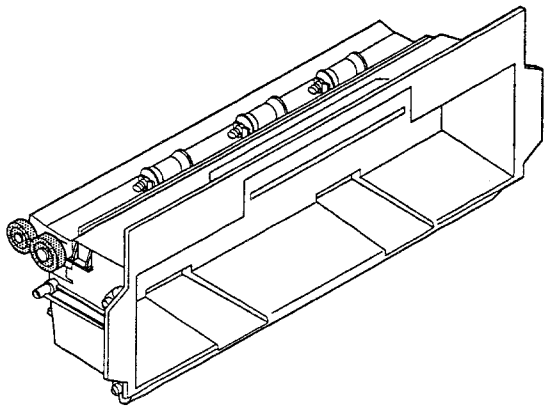
(3) Gear of paper-feed driving unit



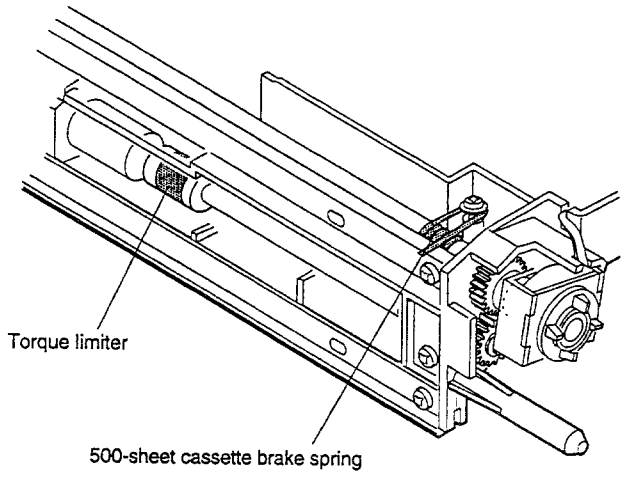
(4) Fusing unit driving gear



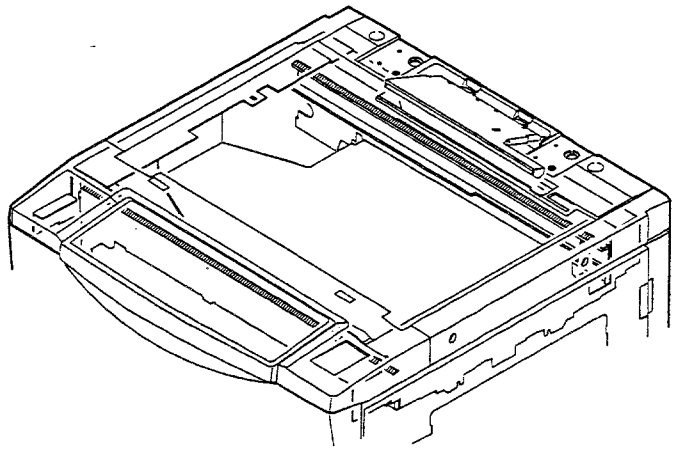
(5) Paper exit roller driving gear



(6) Paper-feed torque limiter 500-sheet tray brake spring



(7) Optical rail



Note 1: Grease (Molycoat (UKOG-0062FCZZ) or White Molycoat (UKOG-0158FCZZ)) must be applied to the correct grease points of each gear. Do not use too much grease.

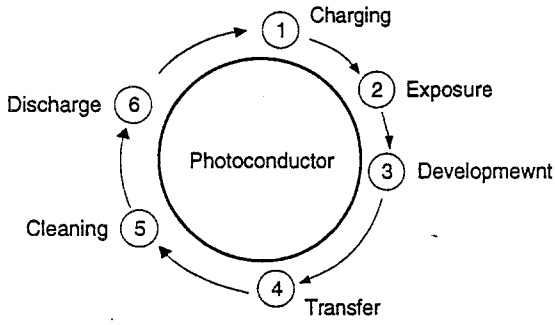
Note 2: No grease shall be applied inside the gear of the magnetic clutch.

[9] PROCESS SECTION

1. Basic process and photoconductor

The indirect static electricity copier PPC uses plain papers, forms latent electrostatic images on the photoconductor surface which can be repeatedly used, develops the images to visible images (toner images), and transfers them on a copy paper.
The PPC (Plain Paper Copier) process is composed of five basic processes of charging, exposure, developing, transfer, and discharge, and one more process of photoconductor cleaning which is required to use the photoconductor repeatedly. (6 processes in total).

(1) Image forming process



① The photoconductor is charged.

② The photoconductor is exposed to form latent electrostatic images.

③ Toner is attracted on the latent electrostatic images.

④ The developed toner images are transferred on paper.

⑤ Toner remaining on the photoconductor surface (remaining toner) is removed.

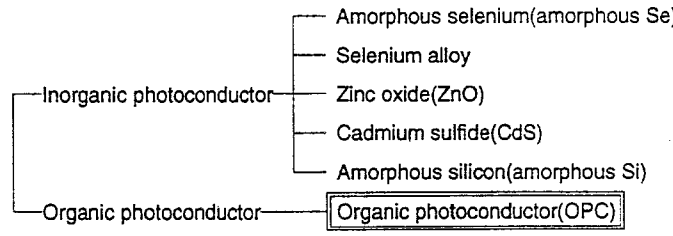
⑥ Electric charges on the photoconductor is discharged.

(2) Photoconductor

Some materials conduct electricity, and some don't. The materials are classified into three categories according to their conductivity: conductors, semiconductors, and insulators.
The classification is only for convenience, and it is difficult to make clear distinction between them.
Generally a material whose conductivity is $10^{8}\Omega$cm or more is called "insulator," and a material whose conductivity is $10^{-3}\Omega$ cm or less is called "conductor."
A material whose conductivity is between the above two is called "semiconductor."
The conductors always conduct electricity, while the semiconductors normally do not conduct electricity but conduct under some conditions.
The photoconductor used in the copier behaves as an insulator when it is not exposed to light. When exposed to light, however, its electrical resistance reduces, that is, it behaves as a conductor. A material which is normally an insulator but becomes a conductor when exposed to light is called "photoconductor" or "photo semiconductor."

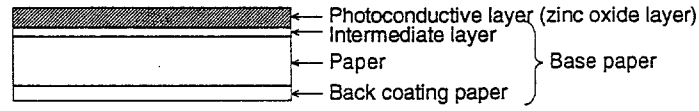
(3) Kinds of photoconductors

Photoconductors used in electrostatic copiers are zinc oxide (ZnO), amorphous selenium (amorphous Se), selenium alloy, cadmium sulfide (CdS), amorphous silicon (amorphous Si), and organic photoconductor (OPC).

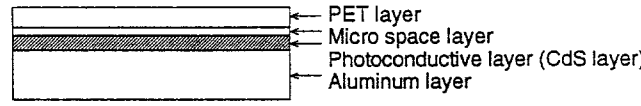


The compositions of major photoconductors are shown below:

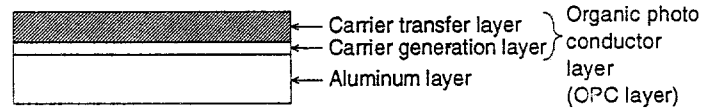
Zinc oxide (ZnO) master



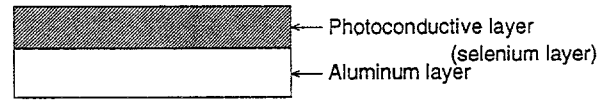
Cadmium sulfide (CdS) drum



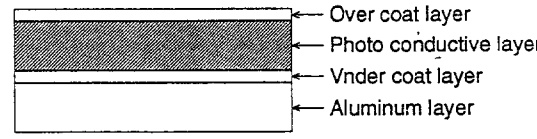
Organic photoconductor (OPC) master or drum



Selenium (Se) drum



Amorphous selenium



Features of organic photoconductors (OPC)

- Can be molded into various shapes (drum, sheet, belt).
- Small dark attenuation in a dark place (large acceptability of electric charges)
- Variations in molecular structures (various molecular designs available)
- Stable to humidity and temperature
- Safe to the environment (no hazard)

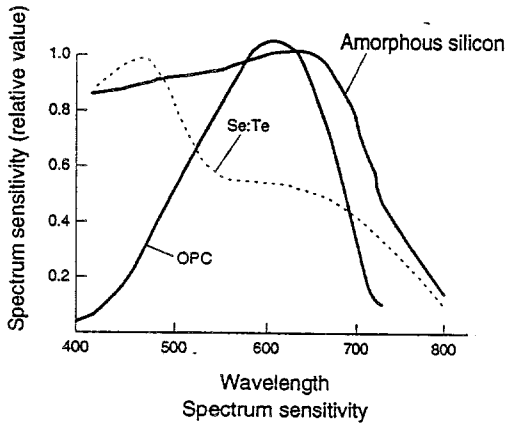
(4) Characteristics of photoconductor

The major characteristics of photoconductive materials used in photoconductors are as follows:

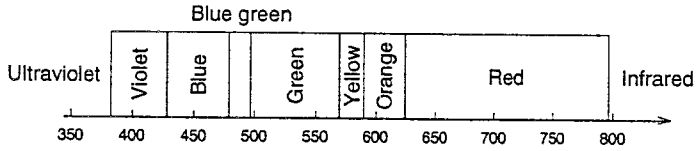
1. Photo sensitivity
2. Spectrum sensitivity
3. Accepting potential
4. Electric charge retainability
5. Remaining potential
6. Fatigue

[Photo sensitivity]
Determined by the attenuating speed when the photoconductor is exposed to light.

[Spectrum sensitivity]
Spectrum sensitivity depends on the wavelength of light.



Relationship between color and wavelength
Human eyes can sense light of wavelength 380nm to 780nm. Light in that range of wavelength is called "visible light." Light whose wavelength is shorter than that is called "ultraviolet light" and light whose wavelength is longer that is called "infrared light." Relationship between the wavelength of light and color is shown below:



[Accepting potential]
The dark resistance of the photoconductor layer increases as the electric field between the layers increases. When the photoconductor is charged, the resistance of the layer decreases as the electric field increases to a high level to restrict the amount of electric charge retained in the photoconductor. The potential at the photoconductor at that time is referred to as the accepting potential, which serves an important factor to determine the potential contrast. The photoconductor is normally charged to a level lower than the accepting potential to prevent the photoconductor from being subject to electric distortion.

[Electric charge retainability]
The retaining time of latent images on the photoconductor is determined by decreasing speed of potential in a dark place. That is, it is measured with the time required for the photoconductor potential in a dark place to decrease to the half of the original level.

[Remaining potential]
When the charged photoconductor is exposed to light, the potential rapidly attenuate at first, and then gradually attenuate. The potential of the photoconductor when the potential starts gradual attenuation is referred to as the remaining potential. The lower the remaining potential is, the greater the voltage contrast is. Therefore, a lower remaining potential is desirable.
The remaining potential greatly affects development of continuous gradations.

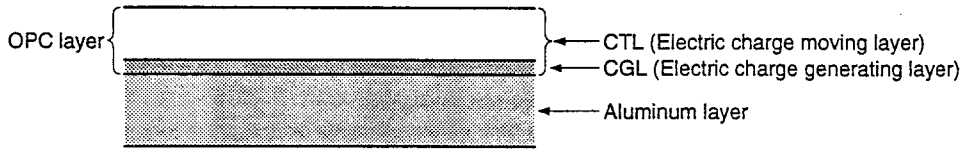
[Fatigue]
When the photoconductor is charged and discharged repeatedly, it may fatigue.
The fatigue means an increase in attenuating speed of the photoconductor potential and a decrease in electric charge retainability.

The characteristics of photoconductor on charging are described above. When charging is repeated by the charger, dust and dirt and dispersed toner may accumulate on the charger wire. This may cause uneven discharge. To prevent against this, clean charger wire well.

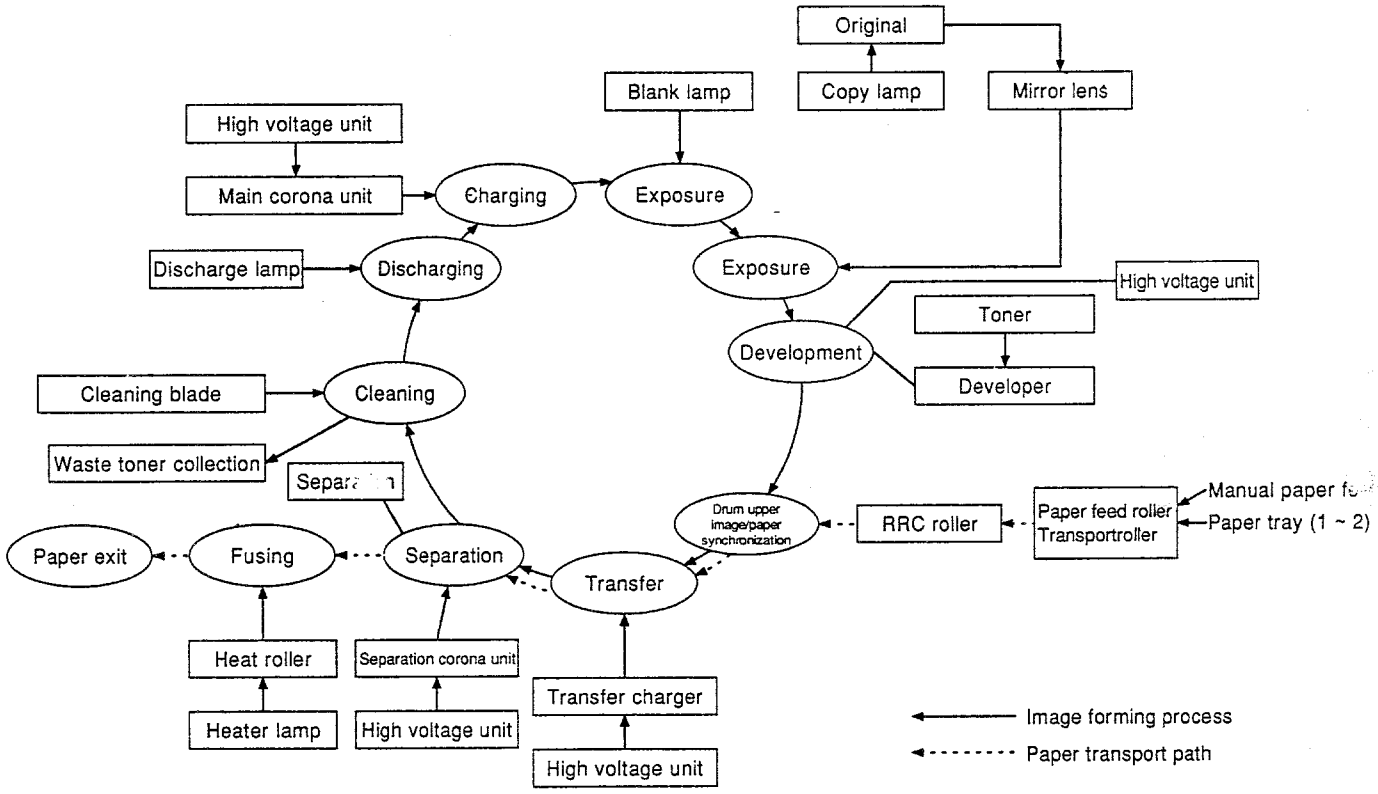
2. Copy process

(1) Photoconductor

- This model uses OPC (organic photoconductor) as photoconductive material.



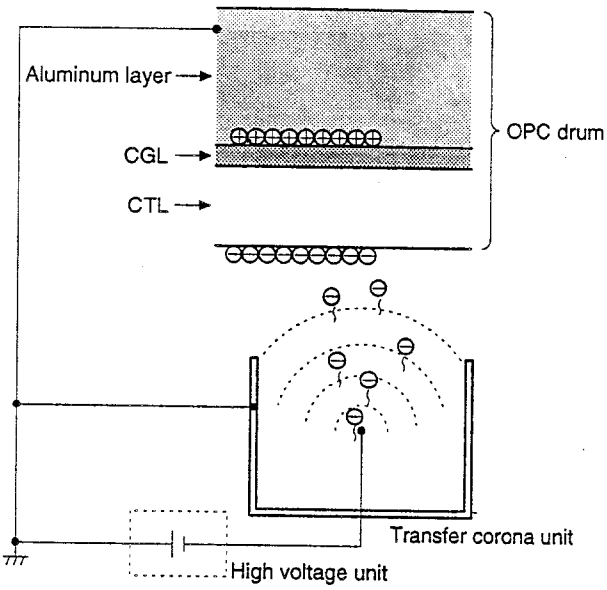
(2) Process diagram



(3) Actual process

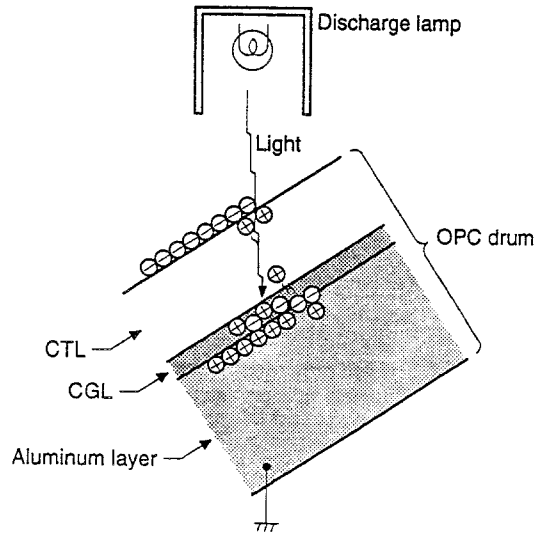
Step 1 (charging)

OPC drum surface by negative corona discharge of the transfer charger to charge the OPC drum negatively. Positive charges are generated in the aluminum layer.



Step 2 (Discharging)

When the OPC drum is exposed to the discharge lamp light, positive and negative charges are generated in the OPC drum CGL. The negative charges move to the positive charges generated in the aluminum layer in step 1, and the positive charges move to the negative charges on the OPC drum surface charged in step 1. The positive charges and the negative charges are neutralized each other in the aluminum layer and on the OPC drum surface. As a result, the OPC drum surface potential becomes 20V ~ 30V.

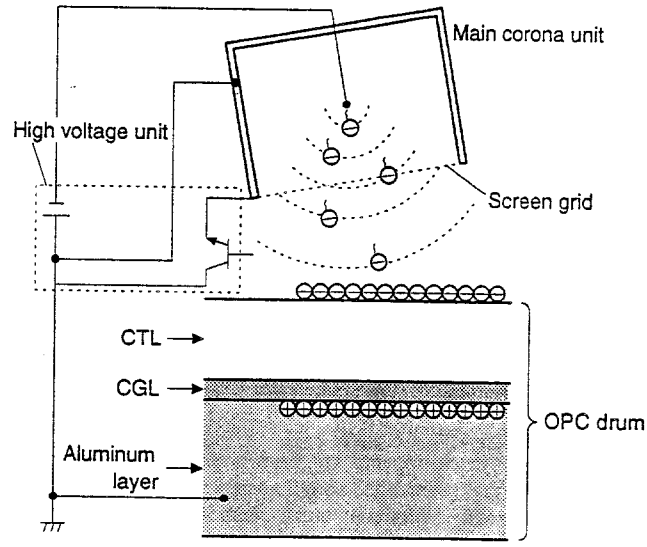


By performing step 1 (Charging) and step 2 (Discharging), the photoconductor itself is initialized to stabilize he drum surface potential.

Step 3 (Charging)

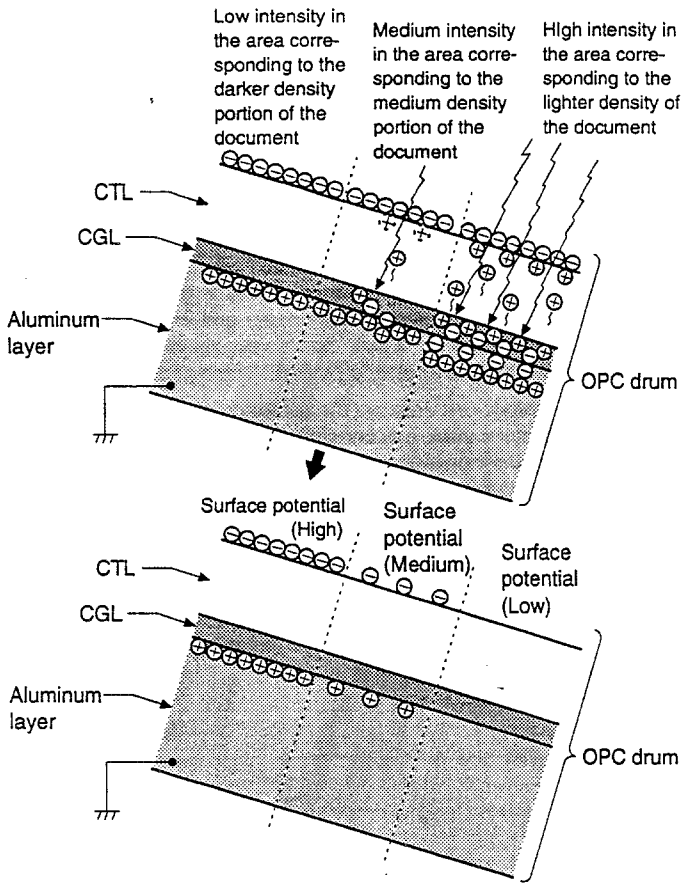
By negative discharging of the main charger, uniform negative charges are applied to the OPC drum surface.
The OPC drum surface potential is controlled by the screen grid voltage to maintain the grid voltage at a constant level.

- When the drum surface potential is lower than the grid voltage, electric charges generated by discharging of the charger go through the screen grid to charge the drum surface potential until it becomes equal to the grid voltage.
- When the drum surface potential virtually reaches the grid potential level, electric charges generated by discharging of the charger flows through the electrode of the screen grid to the high voltage unit grid voltage output circuit, thus always maintaining the drum surface potential at a level virtually equal to the grid voltage.
- The main corona unit employs the scorotron system to charge the photoconductor surface to a certain level uniformly.
  In addition, the conventional corona wire is replaced with the corona charging mechanism by saw-teeth plate (stainless steel plate of 0.1 nm thick). In corona discharge, oxygen molecules in the air are ionized to generate ozone (O_3). The mechanism restrict the generation of ozone.



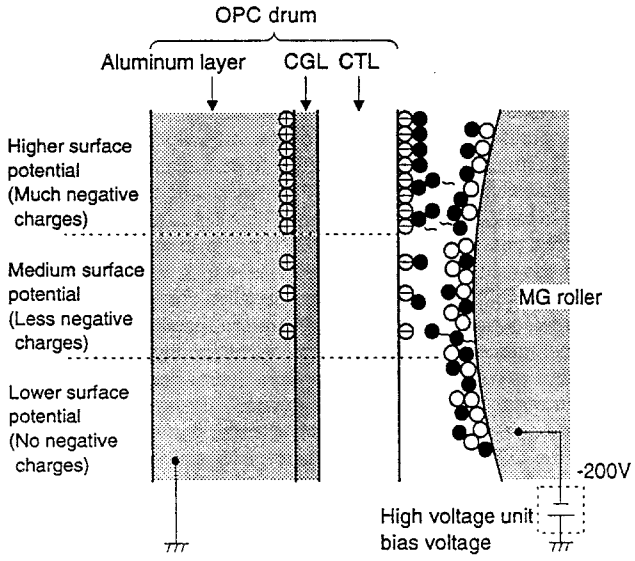
Step 4 (Exposure)

Light from the copy lamp is radiated on the document, and the optical image of the document is reflected by the mirrors and projected through the lens to the OPC drum.
The lighter portion of the document reflects more light (high intensity) to the OPC drum, and the darker portion of the document reflect less light (low intensity) to the OPC drum. Positive or negative charges are generated in the CGL of the OPC drum where lights are radiated.
Negative charges generated in the CGL move towards the positive charges in the aluminum layer generated in step 3. While the positive charges in the CGL move towards the negative charges on the CPU drum surface generated in step 3. Therefore, positive charges and negative charges are neutralized in the aluminum layer and the OPC drum surface at the light radiating position, decreasing the OPC drum surface potential. The CGL electric charge generating amount increases in proportion to the document density, that is, reflected light intensity (the OPC drum surface intensity). Therefore, electric charges are generated less in the CGL layer corresponding to the lighter density of document (higher intensity of the OPC drum surface), and a greater quantity of the negative charges on the OPC drum surface is neutralized, decreasing the OPC drum surface potential more.
On the contrary, electric charges are generated more in the CGL layer corresponding to the darker density of document (lower intensity of the OPC drum surface), and less quantity of the negative charges on the CPU drum surface is neutralized, decreasing the OPC drum surface less. Therefore, the OPC drum surface potential corresponding to the lighter portion of the document is lower, and that corresponding to the darker portion of the document is higher. Latent static-electricity images are formed in the above manner.


Low intensity in the area corresponding to the darker density portion of the document
Medium intensity in the area corresponding to the medium density portion of the document
High intensity in the area corresponding to the lighter density of the document
CTL
CGL
Aluminum layer
OPC drum
Surface potential (High)
Surface potential (Medium)
Surface potential (Low)
CTL
CGL
Aluminum layer
OPC drum

Step 5 (Development)

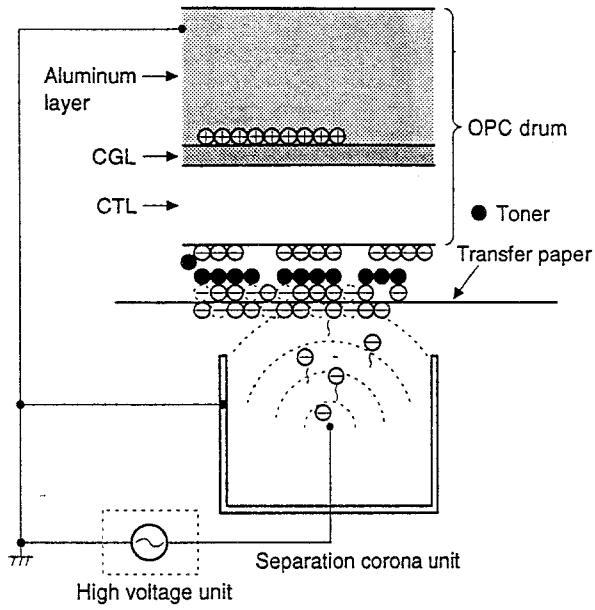
Toner is attached to the latent static-electricity images on the drum surface to change them to visible images. The two-component magnetic brush development system charges toner positively by friction with carriers, and toner is attached to negative charges on the drum surface. The potential in the darker document projecting area (low intensity) is high (much negative charges) and attracts more toner. The potential in the lighter document projecting portion (high intensity) is low (less negative charges), and attracts less toner.



At that time, a bias of –215V is applied to the MG roller (magnet roller), which is provided for preventing toner from being attracted by the residual voltage (about –80V to –100V) in the lighter portion after exposure.

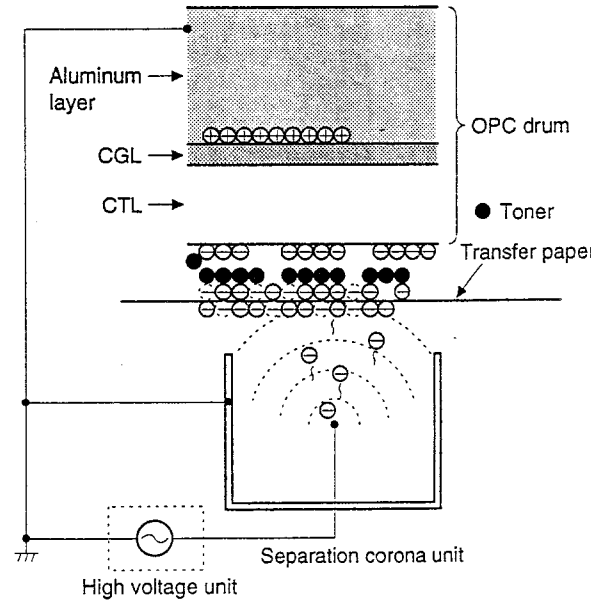
Step 6 (Transfer)

The transfer paper is charged higher than the OPC drum surface potential by strong negative discharge of the transfer charger, making the binding force between the transfer paper and toner stronger than that between the drum and toner, attracting toner to the transfer paper.



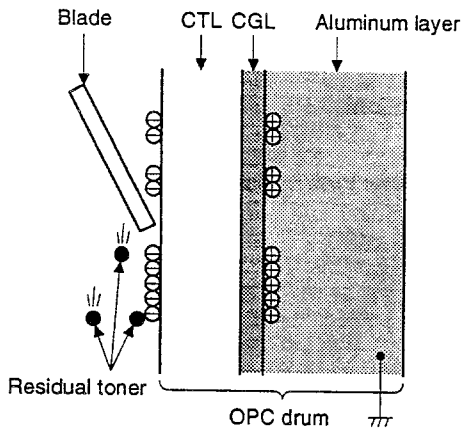
Step 7 (Separation)

After transfer, the copy paper and the drum are negatively charged. Since, however, the negative potential of the copy paper is higher than that of the drum, a sucking force is applied between the drum and the copy paper. To avoid this, AC corona is applied to the copy paper by the separation charger to decrease the copy paper potential to the same level as the drum surface potential. The sucking force between the copy paper and the drum is weakened by this, allowing separation of the copy paper by its own extending force. If the copy paper is not separated by the separation charger, it is separated by the separation pawl mechanically.



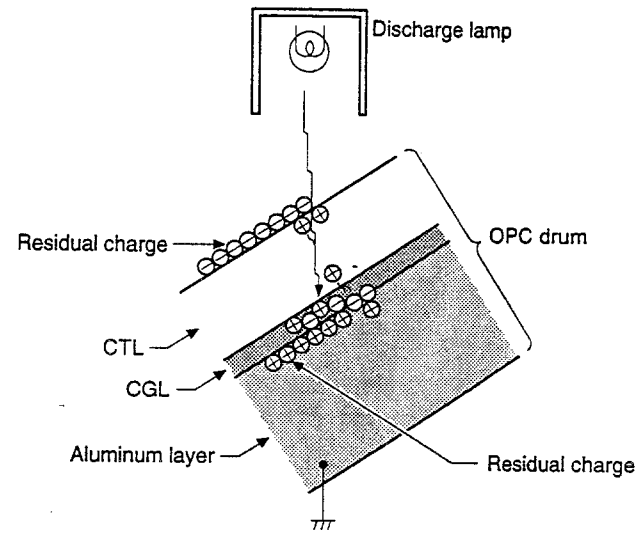
Step 8 (Cleaning)

Residual toner on the drum is removed by the cleaning blade. The removed toner is sent to the waste toner container by the waste toner transport screw.

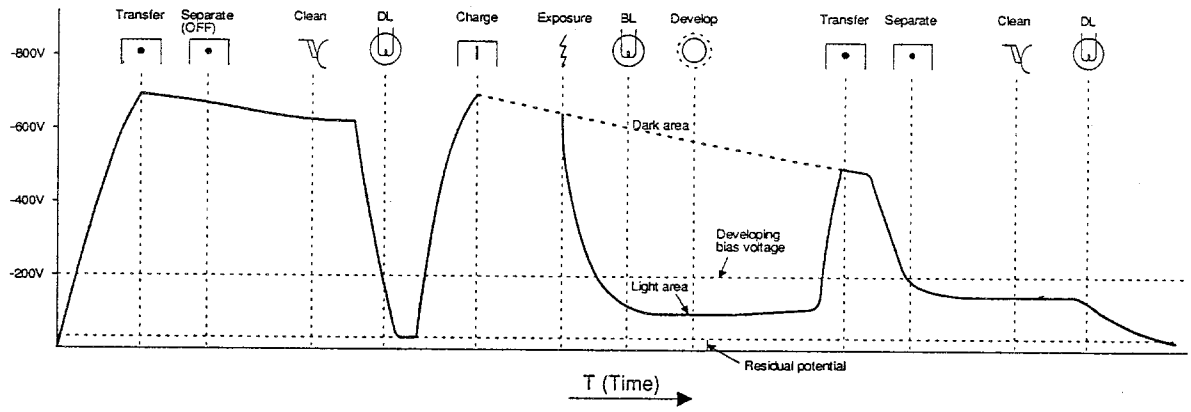


Step 9 (Discharging)

When the OPC drum is exposed to the discharge lamp light, positive and negative charges are generated in the OPC drum CGl. The negative charges generated in the CGL move towards the residual positive charges in the aluminum layer, while the positive charges in the CGL move towards the residual negative charges on the OPC drum surface. Therefore, the positive and the negative charges are neutralized in the aluminum layer and on the OPC drum surface, removing the residual charges on the OPC drum surface. As a result, the OPC drum surface potential becomes 20V – 30V.



(4) Transit of photoconductor drum surface potential



3. Process correction systems

(1) Outline of the correction systems

The SF-1025 has the correction systems for the optical unit, and the photoconductor drum unit.
The above two correction systems work together to provide stable copies.

These functions are provided to maintain proper copy qualities for a long time and to correct the parts characteristics, and are controlled by the software, so cannot be seen from the outside.

(2) Correction operations

1. Photoconductor drum unit correction (Photoconductor drum sensitivity correction)

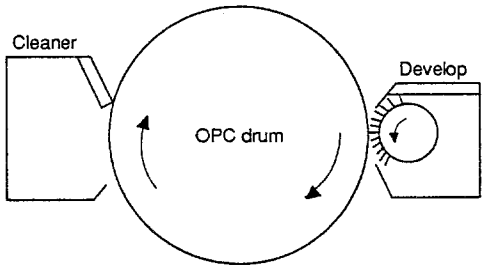


Fig. 1

Change the tickness of the carrier transport layer (CTL).
By the developper.
By the cleaner blade.

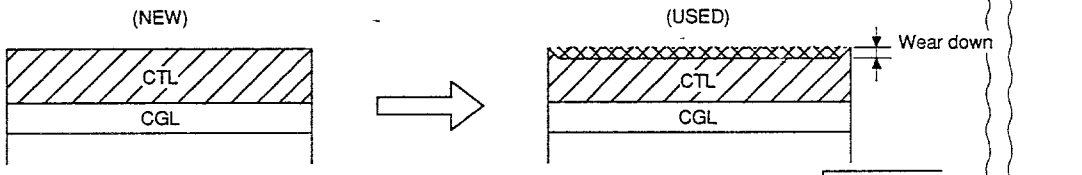


Fig. 2

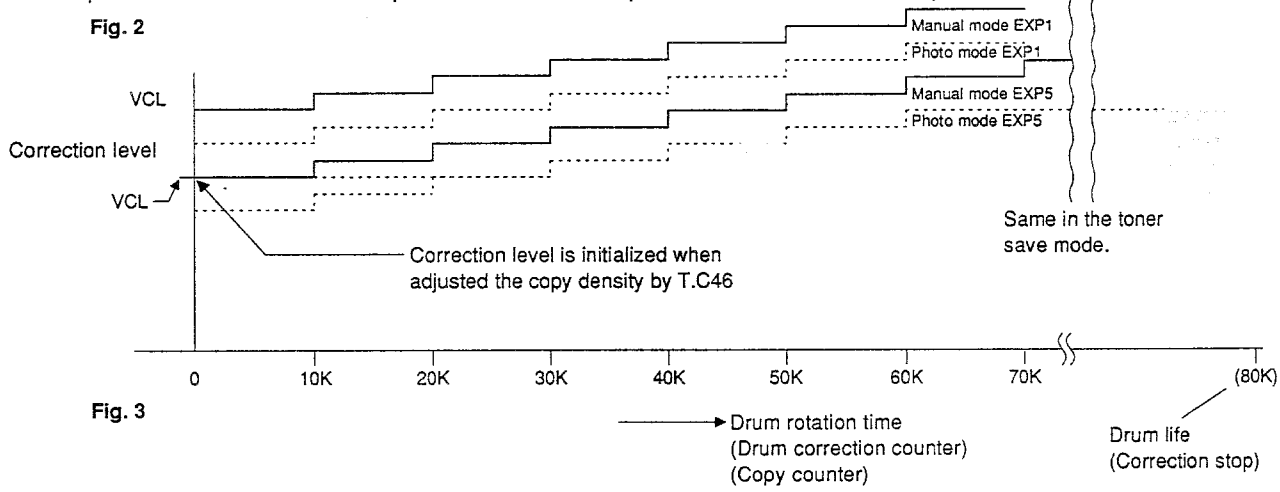


Fig. 3

The photoconductor drum is subject to mechanical stress by the cleaning blade to reduce the thickness of the OPC layer.
The photoconductor is also subject to optical stress. These stresses reduce the photo sensitivity of the photoconductor drum, producing background copying on copy papers. To avoid this, the copy lamp voltage may be changed to adjust the copy density.
In this model, to reduce the number of service calls, the reduction in the photo sensitivity of the photoconductor drum is corrected by increasing the copy lamp voltage automatically.

This correction is valid in all the copy modes.
The correction is performed until Max. 80K (the drum life) after execution of TC46 (picture quality adjustment), within the range of the max. supply voltage of the copy lamp.

2. Optical unit correction (correction for dirt)

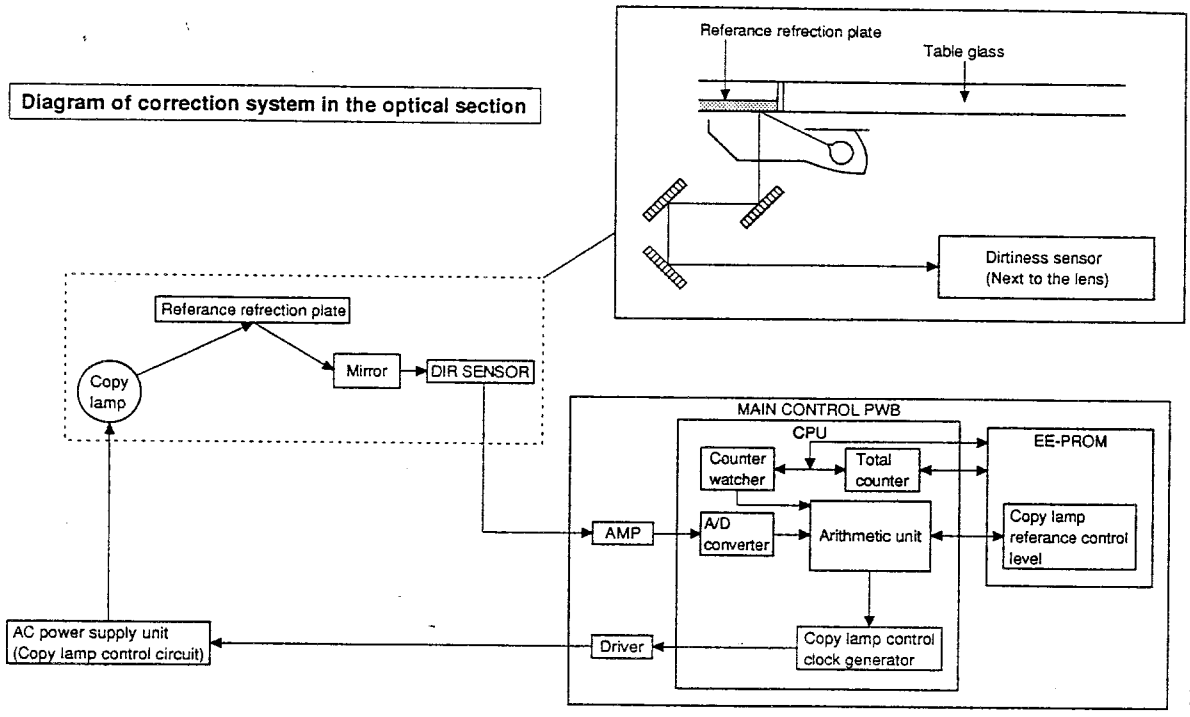


Fig.5

The optical unit correction is to negate the effect of dirt on the copy density and to save trouble in cleaning of the optical unit.
When the lamp, the mirrors, and the reflector in the optical unit are contaminated with dust and toner, light quantity radiated onto the photoconductor drum is decreased to increase the copy density or to produce background copying,
The above troubles may be removed by changing the copy lamp voltage to adjust copy density. But it requires serviceman's works.
In this model, dirt on the optical parts such as the lamp, the mirrors, and the reflector is detected by the auto exposure (AE) sensor and the copy lamp light quantity is automatically adjusted according to the dirt level, minimizing the change in the copy density caused by the dirt on the optical parts.
When the optical parts are contaminated, the reflection rate decreases to decrease the quantity of light which is passed to the optical dirt sensor. The level of dirt is detected in this manner.

(Initial correction reference value setting)
After completion of test command 46, in the first initializing of the optical system, the scanner unit stops at the standard reflection plate at the back of the document stopper to light the copy lamp with a certain voltage, and the output voltage level of the auto exposure (AE) sensor is stored as the correction level.

(Dirt Correction operation)
If the number in 100's digit of the total counter is an odd number, only the CPU internal register flag is set and no correction is made.
If the number in 100's digit of the total counter is an even number and the above stated flag has been set (approx. every 200 copies), the copy lamp is lighted at the former correction level in initializing of the optical system. The then output voltage level of the auto exposure (AE) sensor is compared with the former correction level. If light quantity at the correction level is not obtained, the copy lamp voltage is corrected. (100V series, CLV + 0.33V; 200V series, CLV + (0.33V x 2))
Correction is made until max. 80K copies (the drum life) after execution of test command 46 (picture quality adjustment) within the range of the max. supply voltage of the copy lamp.

[10] DEVELOPING UNIT

1. Basic theory

(1) Two-component developer

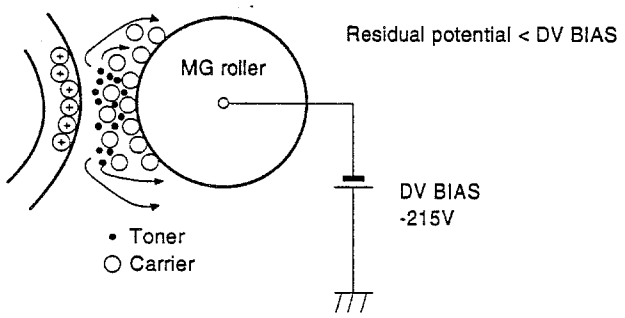
The developer consists of toner and carrier, which is usually called developer.
The carrier is a media that applies toner to the static latent image on the photoconductor.
As the carrier is stirred with the toner, the friction occurred thereby charges it to positive or negative.
Because the developer fatigues and affects its characteristics that deteriorates the copy quality, it needs to be replaced with a fresh one at a given period.

(2) Two-component magnetic brush development

A rotary, non-magnetic sleeve is provided over the magnet roller and is rotated.
Carriers forms the magnetic brush on the sleeve surface by magnetic force to make toner be attracted onto the latent electrostatic image on the photoconductor.

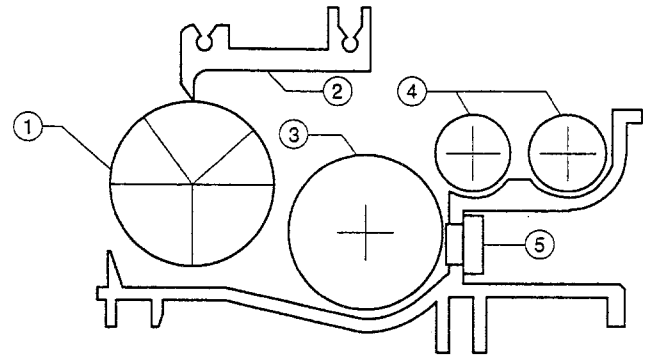
(3) Developing bias voltage

When the photoconductor is exposed to light, the surface potential (voltage) of the photoconductor is not removed completely and remains as a residual potential. Therefore, the toner stuck on the photoconductor by the residual potential stains a white area of the copy background.
To prevent this, a voltage of the same charge on the photoconductor surface which is higher than the charged potential is added to the magnetic roller to avoid the toner from remaining on the photoconductor surface.



Developing bias voltage

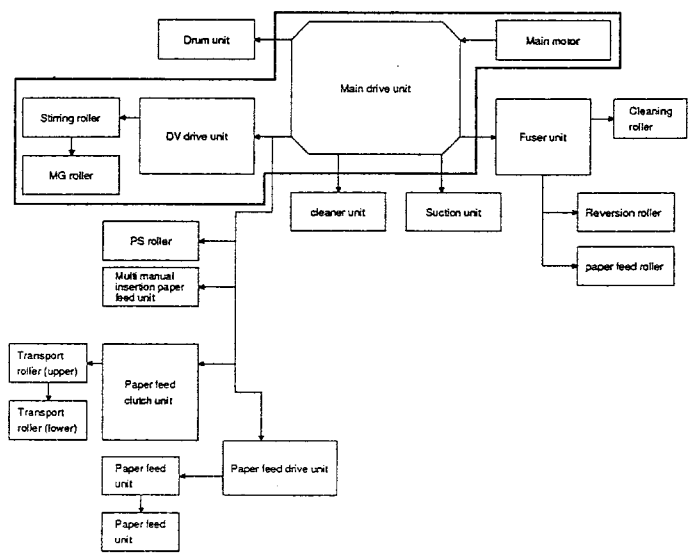
2. Structure



No.	Name	
①	Developer mangetic roller	Magnetic brush is formed to the carrier by the magnetic force.
②	Developer doctor plate	A plate employed to limit the height of the magnetic brush.
③	Developer stirring roller	Carrier within the developing unit is stirred to distribute the toner evenly.
④	Developer transport roller	The toner fed from the toner hopper is supplied to the stirring unit.
⑤	Toner density sensor	Used to detect the density of the toner contained in the developer.

3. Operation

When the power is turned on, the machine goes into the warmup mode and the main motor starts to run in 1.5 minutes.
The developer unit is driven by the main motor via the main drive unit.
Ratio of the carrier and the toner within the developing unit is monitored by the toner density sensor as a change in the magnetic transmission rate and the voltage is sent to the analog input line of the CPU of the main board.
In the CPU, the input voltage level is monitored and the main motor and the toner motor is controlled until the optimum density is obtained. Then the toner is supplied, transported, and stirred.



Drive system diagram

[11] PAPER FEED UNIT

1. Outline

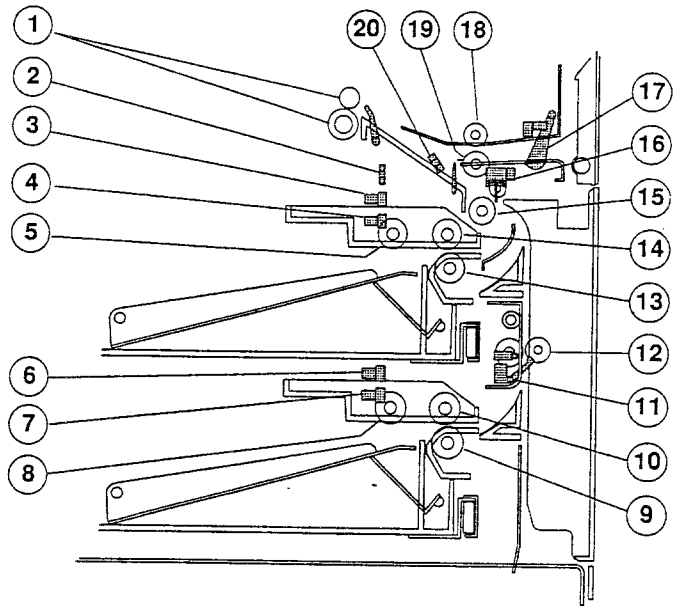
The front load method and the foldable multicopy table are provided to save space. The machine is equipped with two 500-sheet trays and a manual feed table.

Standard setting

(A4) (11" x 8½)	
(A3) (11" x 17")	

SF-1025

2. Basic configuration

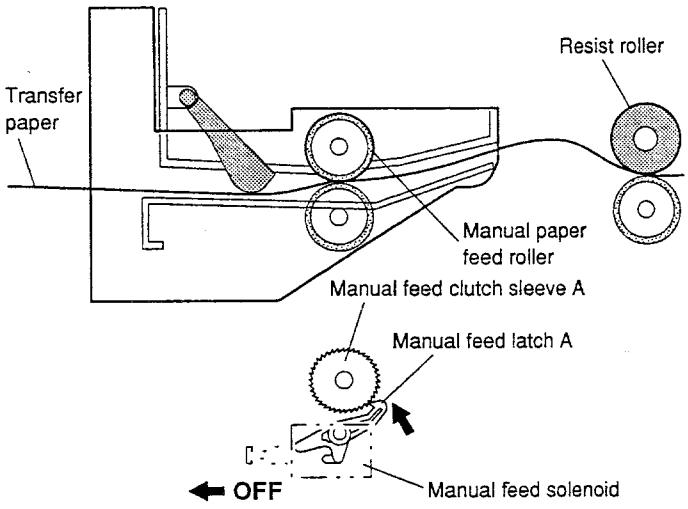


No.	Name	
①	Resist roller	Synchronizes the copy paper with image by controlling the resist roller clutch (RRC).
②	(PPD2) Paper transport sensor	For control of the paper transport roller clutch (TRC).
③	(LUD2) Lift upper limit sensor	For control of the upper tray liftup motor; a high on this line stops the motor.
④	(PED2) Paper presence sensor	For detection of paper in the upper tray; a low on this line shows that paper is present.
⑤	Takeup roller	The upper tray paper takeup roller descends at the moment the paper feed solenoid turns on.
⑥	(LUD3) Lift upper limit sensor	For control of the lower tray liftup motor; a high on this line stops the motor.
⑦	(PED3) Paper presence sensor	For detection of paper in the lower tray; a low on this line shows that paper is present.
⑧	Takeup roller	The lower tray paper takeup roller descends at the moment the paper feed solenoid turns on.
⑨	Counter paper feed roller	For prevention of double feed paper using the lower paper reversion roller.
⑩	Paper feed roller	Lower tray paper feed roller with an internal one-way clutch.
⑪	(PID) Paper entry sensor	Entry of paper from the lower tray is sensed to turn off the paper feed solenoid.
⑫	Paper transport roller	For transport of paper from the lower paper tray.
⑬	Paper reversion roller	For prevention of double feed paper using the upper paper reversion roller.
⑭	Paper feed roller	Upper tray paper feed roller with an internal one-way clutch.
⑮	Paper transport roller	Paper from the tray is transported to the resist roller.
⑯	(TFD) Full waste toner sensor	A low on this line shows the full toner condition.
⑰	(PED1) Paper presence sensor	For detection of manual feed paper; a low on this line shows the paper is present.
⑱	Paper feed roller	Manual paper feed roller with one-way clutch
⑲	Paper reversion roller	For prevention of double feed paper using the lower paper reversion roller.
⑳	(PPD1) Paper transport sensor	For detection of paper from tray and manual paper feed.

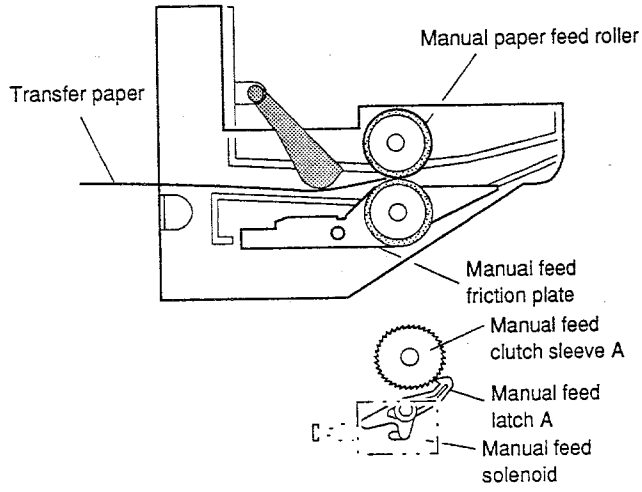
3. Basic operation

(1) Manual paper feed operation

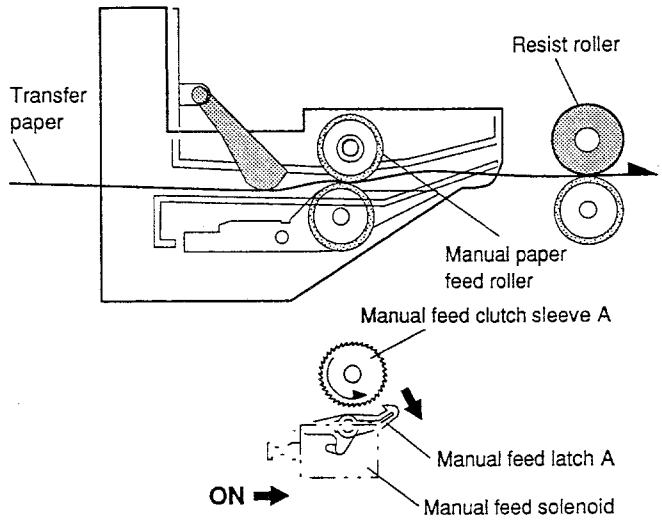
① When the manual feed is at rest, the manual paper feed solenoid (MPFS) is off. Latches and clutches are in the position shown in the figure below.



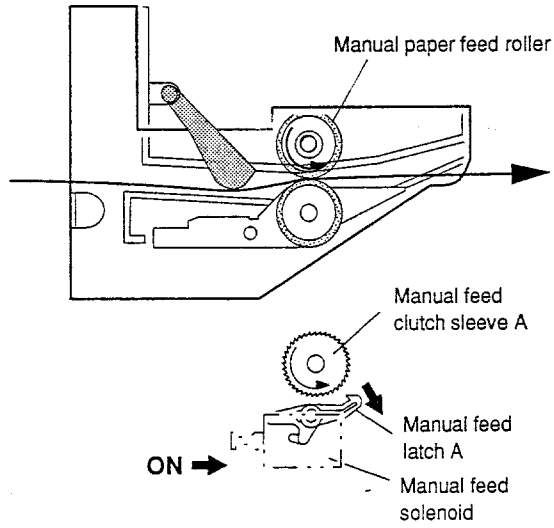
② When the PRINT switch is pressed, the manual paper feed solenoid (MPFS) turns active, the manual feed latch A disengages from the manual feed clutch sleeve A, and the manual feed roller starts rotating. In this moment, paper feed is started.

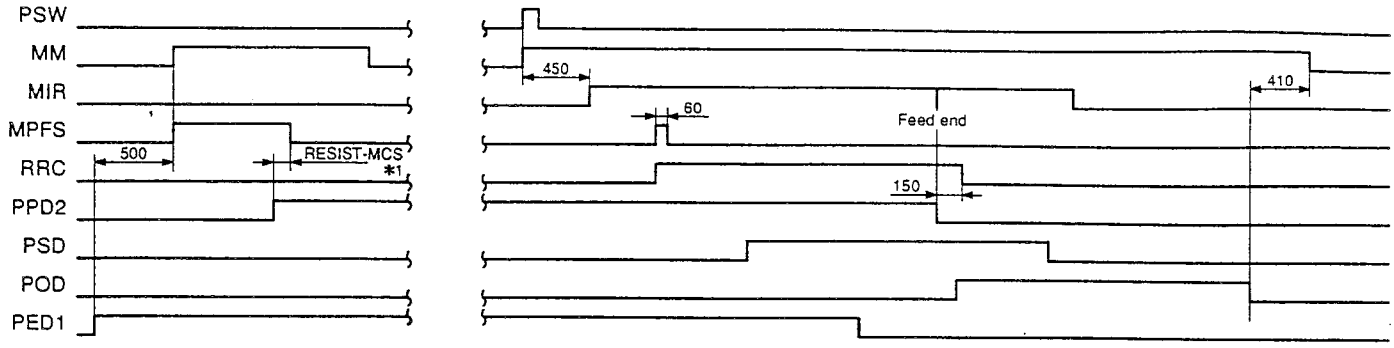


③ After the lead edge of the copy paper is detected by PPD2, the manual feed solenoid turns off after 0.2 second. (It is set by TC51-2.)
This produces a buckle in the paper between the resist roller and the paper feed roller.



④ In synchronization with rotation of the resist roller, the manual feed solenoid turns on for 0.08 seconds and the manual paper feed roller rotates. A misfeed caused by a lack of seizure of the resist roller is prevented.





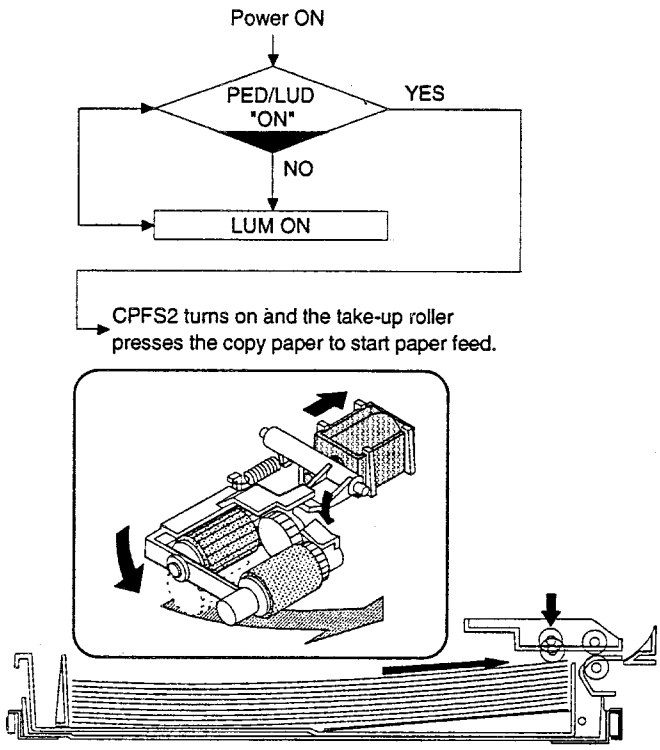
[msec]

(2) Tray paper feed operation

For the upper and lower, tray, paper is fed in the same manner.
The operations of the lower tray are described below.

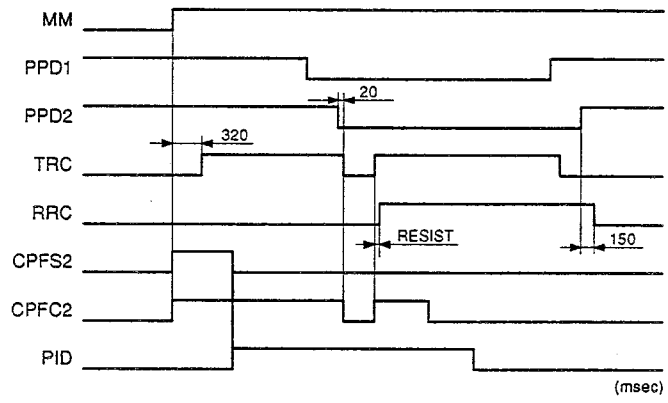
① Liftup action

When the power is turned on to the copier, the main circuit initiates to check every sensor.
The liftup motor is turn on or off according to the state of the paper presence sensor (PED) and the liftup sensor, and it becomes ready to feed paper.



② Paper feed operation

When the PRINT switch is pressed, the tray paper feed solenoid (CPFS2) and the tray paper feed clutch (CPFC2) turn on. As the solenoid turns on, the paper takeup roller is forced down to make contact with paper.
As the clutch turns on, the paper feed roller and the takeup roller start to rotate to pick up paper.
The paper picked up passes over the paper entry sensor (PID) and sent to the paper transport roller area.
The paper is transported from the paper feed section to the resist roller, then transported to the process section in synchronization with the optical system.



Lower tray paper feed timing chart

* 500 ms ON when A3 (11"x17") paper feeding with the lower tray.

[12] TRANSPORT/FUSING SECTION

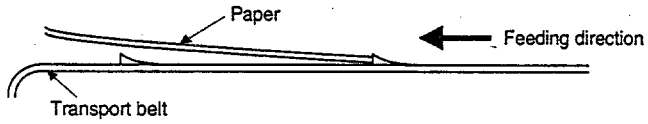
1. General

The SF-1025 allows transport of paper of max. A3 (11" x 17") and min. A6R (8½" x 5½").
After images are transferred on the paper, the paper is separated from the drum and transported to the fuser section by rotations of the resist roller and the transport belt.
The paper separation sensor (PSD) is provided at the transport section. This sensor (PSD) is used to sense paper separation and for drive timing of the duplex gate solenoid (DGS) after fusing.

2. Basic composition and functions

(1) Transport section

① Transport belts (2pcs)
The transport belts are provided with notches to hold paper rear ends.



② Separation sensor (PSD)
This is a transmission type sensor, and attached to the main body chassis.

③ Suction fan motor and ozone filer
Ozone generated in the process high voltage section is absorbed through the filter.

(2) Fusing section

① Upper heat roller
The upper heat roller is teflon-coated. (Reversed crown shape)

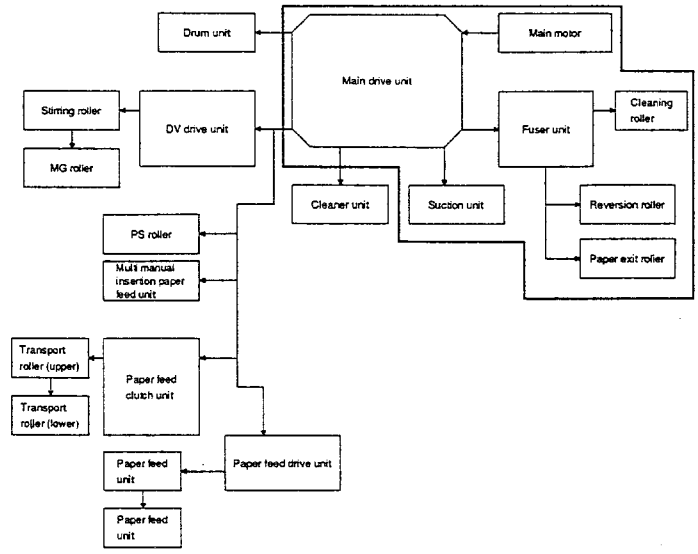
② Lower heat roller
A silicone rubber roller is used. (Crown shape)

③ Upper cleaning roller
The upper cleaning roller is impregnated with silicone oil to remove dirt on it and to provide better separation effect, lengthening the heat roller lifetime.

④ Separation pawl
The upper heat roller is equipped with four pawls which are teflon coated to reduce friction.
the lower heat roller is equipped with two pawls.

⑤ Upper/lower separation function
The upper and lower heat roller sections are separated by rotating operations with the transport roller as a fulcrum, providing better serviceability.

⑥ Drive system division
The fuser unit is rotated by the main drive unit. In case of manual rotation of the fuser unit to remove paper jam, however, excessive loads may be applied to the gears. To prevent against this, the spring clutch is provided in the main drive gears.



[13] HIGH VOLTAGE SECTION

1. General

There are three kinds of coronas; the main corona, the transfer corona, and the separation corona. The main corona employs the scorotron system, where the drum surface is evenly charged with negative charges controlled by the screen grid between the corona and the drum. The transfer corona is used to transfer toner images on the drum to the copy paper. A high, negative voltage is applied to the rear side of the paper. The separation corona applies AC corona to the copy paper to eliminate potential difference with the drum to allow separation of the paper.

2. Basic composition

(1) Main (charging) corona – High voltage transformer (MHVG)

–700μA (Electrode sheet front-rear balance difference: max. 8μA)

	Grid voltage	Developing bias voltage
Standard mode	–730V	–215V
Photo mode	–490V	
TSM mode	–610V	

(2) Transfer corona – High voltage transformer (THVG)

–35±5μA (Electrode sheet front-rear balance difference: max. 8μA)

(3) Separation corona – High voltage transformer (SHVG)

AC4KV ±0.1KV (Electrode sheet measurement 0±10μA)

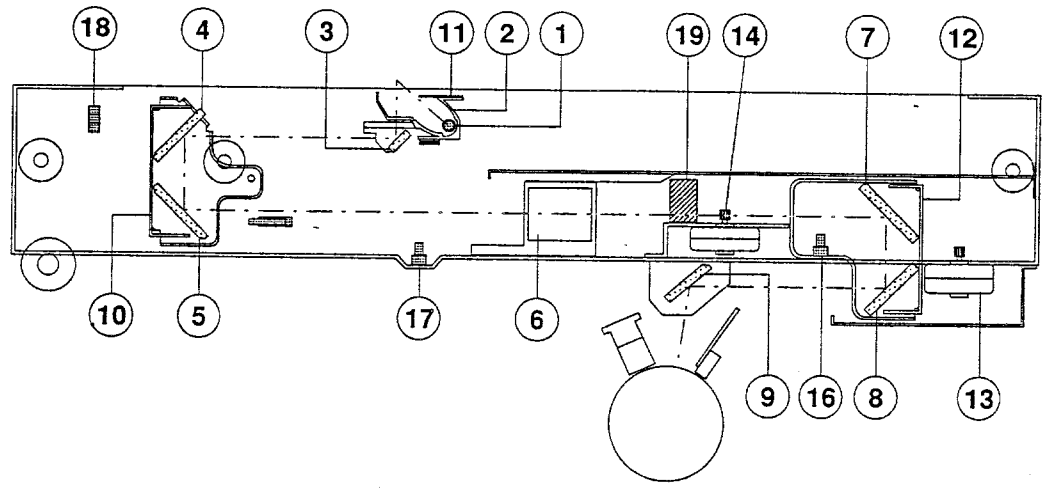
[14] OPTICAL SECTION

1. General

The SF-1025 is composed of the fixed focus lens and six mirrors. The lens and the mirrors are moved by the stepping motor to positions according to the magnification ratio of reduction, normal, or enlargement copy. magnification ratio is changed from 0.5 to 2.0 in 151 steps by 1%. The six mirrors realizes a compact design. The slit exposure system with the moving light source is employed. Copy image density can be controlled by changing light quantity of the copy lamp.

The automatic exposure sensor is provided to sense density of the original and the copy lamp light quantity is controlled by the main circuit to provide even copy image.

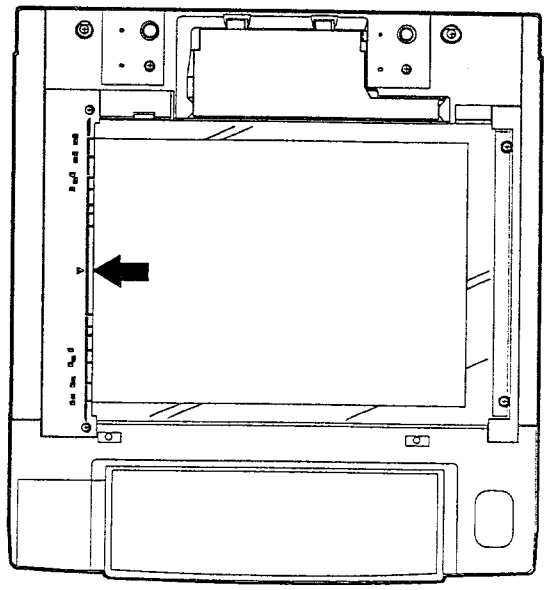
2. Basic composition



①	Copy lamp	②	Reflector	③	No. 1 mirror
④	No. 2 mirror	⑤	No. 3 mirror	⑥	Lens
⑦	No. 4 mirror	⑧	No. 5 mirror	⑨	No. 6 mirror
⑩	Mirror base B unit	⑪	Copy lamp unit	⑫	Mirror base C unit
⑬	Lens drive motor	⑭	No. 4, No. 5 mirror base drive motor	⑮	Mirror motor
⑯	Mirror base home position sensor	⑰	Lens home position sensor	⑱	Mirror home position sensor
⑲	Automatic exposure sensor				

(1) Original table

The original table is fixed, and an original is set to the left center.



(2) Copy lamp

100V system 85V 275W
200V system 170V 310W

(3) Mirror

Six mirrors are used.
No. 1 mirror is attached to copy lamp unit, No. 2 and No. 3 mirrors to mirror base B, No. 4 and No. 5 mirrors to mirror base C.
Mirror bases A and B are scanned when copying. Mirror base C is used to change the distance between an original and the photoconductor in reduction or enlargement copy for changing the vertical magnification ratio.

(4) Lens (Fixed focus lens)

- Construction: 1 group 3 lenses
- Brightness: F8.5
- Focal distance: 195mm ±1%

(5) Lens home position sensor (LHPS)

This sensor is used to sense lens position. The output signal of this sensor serves as the basic signal to control the copy magnification ratio.

(6) No. 4, No. 5 mirror base home position sensor (MBHPS)

This sensor is used to sense mirror base C (No. 4, No. 5 mirrors). The output of this sensor serves as the basic signal to control the copy magnification ratio.

(7) Lens base

The lenses are mounted to this base, which is moved in the paper feed direction for reduction copy and in the paper exit direction for enlargement copy.

(8) Lens slide shaft

This shaft is used to control optical axis of the lenses in reduction or enlargement copy. The lenses follow on the slide base shaft.

(9) Lens drive wire

The lens drive wire is used to move the lens base.

(10) Mirror base C

No. 4 and No. 5 mirrors are attached to mirror base C. Mirror base C is moved by the mirror base drive motor to adjust the distance between an original and the photoconductor in reduction or enlargement copy.

(11) Mirror base C (No. 4, No. 5 mirrors) drive wire

This wire is used to move mirror base C (No. 4, No. 5 mirrors).

(12) Mirror motor

The mirror motor is a DC servo motor used to move mirror base A and mirror base B. Its rotation is adjusted according to each magnification ratio.

(13) Mirror home position sensor (MHPS)

This is a transmission type sensor used to sense the home position of mirror base A.

(14) Mirror base B

No. 2 and No. 3 mirrors ar attache to mirror base B, which is scanned by the mirror motor.

(15) Copy lamp unit

This is composed of No. 1 mirror, the thermal fuse, the copy lamp, the exposure adjusting plate, and the reflector, and is scanned by the mirror motor.

(16) Thermal fuse

The thermal fuse is provided at the reflector to prevent against abnormal temperature rise in the optical system. In case of an abnormal temperature rise, it turns off the power source of the copy lamp.
100V system 109 °C
200V system 109 °C

(17) Reflector

Light from the copy lamp is reflected by the reflector onto an original.

(18) Exposure adjusting plate

There are three exposure adjusting plates attached to mirror base A to adjust exposure balance between the front and the rear sides.

(19) Mirror base drive wire

The mirror motor power is transmitted to mirror base A and mirror base B to scan the mirror base by means of this wire.

(20) Mirror base (No. 4, No. 5) drive motor

This is a stepping motor used to drive mirror base C.

(21) Lens drive motor

This is a stepping motor used to change lens positions.

(22) AE sensor

The AE sensor senses the original density by the magnitude of light reflected from the original. The center area of about 100mm wide in the mirror base scan direction is the light measuring area.
The elements are photo diodes.

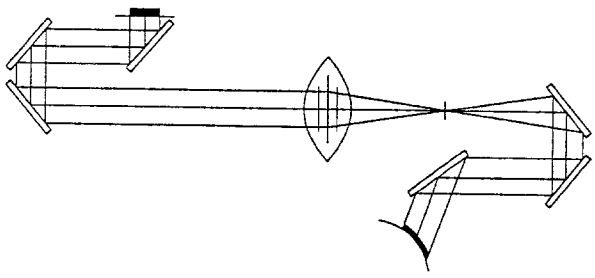
(23) Blank lamp operation

When a reduction image is copied on a large size paper in reduction copy, the outside area becomes black background.
In another copy mode also, electric charges are remained on the outer area of the original image and toner is attracted to the area. To discharge this, light is radiated on the drum by the blank lamp to prevent against adhesion of toner in the outer area of the image.
The lead edge void is formed by the drum discharge system with the blank lamp light. The void width can be adjusted by the diagnostic function.

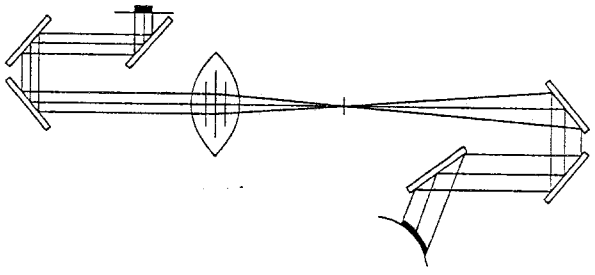
3. Basic operation

(Relation between an original, the lenses, and images in each magnification ratio)

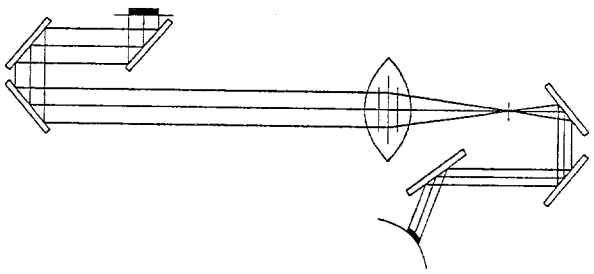
Normal copy: The distance between the original surface set on the table glass and the lens is adjusted to the distance between the lens and the exposure surface of the photoconductor to make a normal copy.

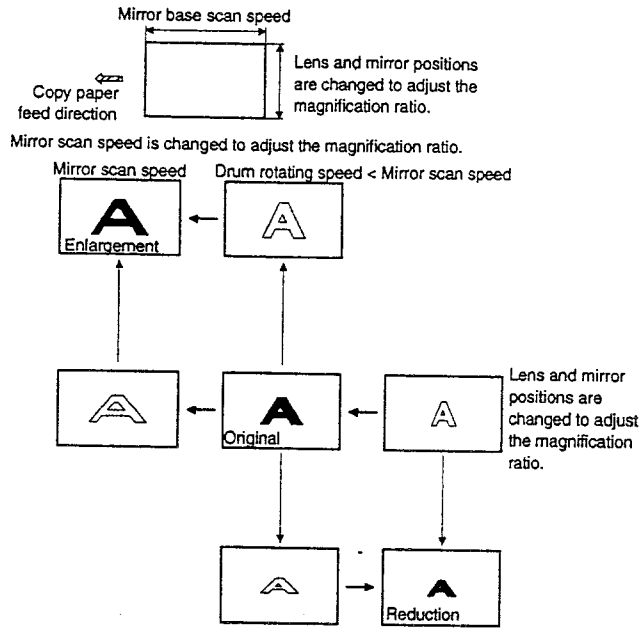


Enlargement: The lens approaches nearer the original compared from the normal copy and the distance between the original surface and the lens is shortened.
No. 4 and No. 5 mirrors go far from the lens and the distance between the lens and the exposure surface of the photoconductor becomes greater.
The distance between the original and the exposure surface of the photoconductor becomes greater than in the normal copy.



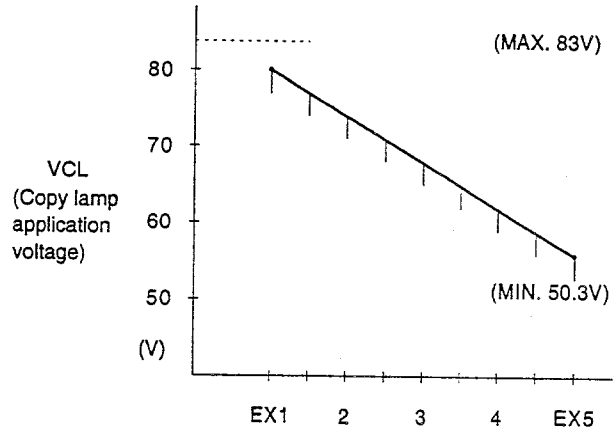
Reduction: The lens approaches nearer the photoconductor compared from the normal copy, and the distance between the original surface and the lens becomes greater.
The distance between the lens and the exposure surface of the photoconductor becomes shorter.
No. 4, 5 mirror and the mirror base go far from the lens.
The distance between the original and the exposure surface of the photoconductor becomes greater than in normal copy.




Mirror base scan speed
Copy paper feed direction
Lens and mirror positions are changed to adjust the magnification ratio.
Mirror scan speed is changed to adjust the magnification ratio.
Mirror scan speed
Drum rotating speed < Mirror scan speed
Enlargement
Original
Reduction
Lens and mirror positions are changed to adjust the magnification ratio.

(Copy lamp control for each copy density mode)

° Manual density copy mode



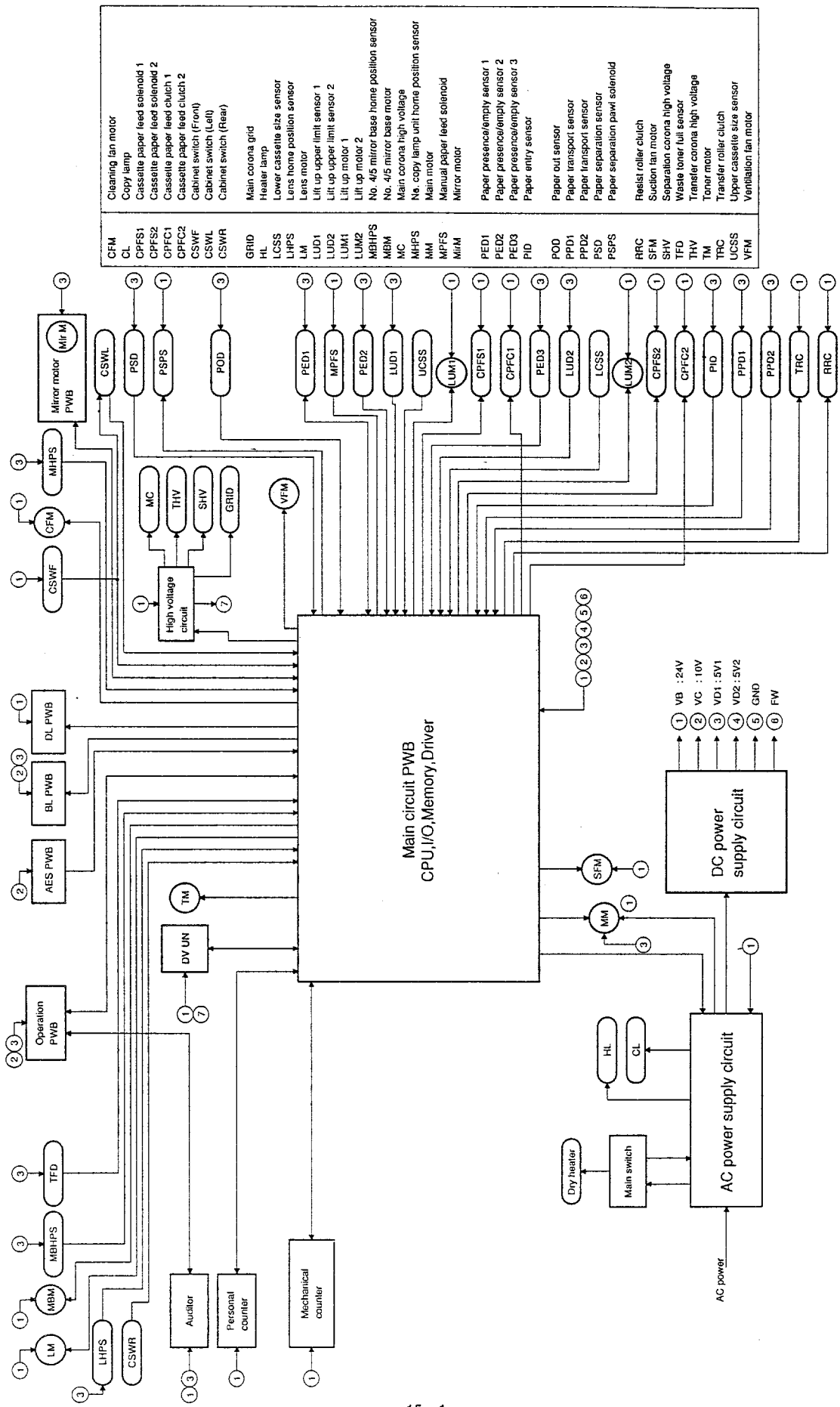
Perform simulation 46-01 to determine the copy lamp application voltages (Vcl) in EX1 and EX5.
When the copy lamp application voltages in EX1.0 and EX5.0 are determined, the voltage difference between them is divided into nine.
The application voltage of the copy lamp at each exposure level is determined by changing ON time duty of the copy lamp ON control signal.

° Photo density copy mode

The control method is same as in the manual density copy mode. The image density is controlled by decreasing the grid bias voltage of the charging corona. To reproduce half tone image, however, ON time duty of the copy lamp ON signal is made shorter than in the manual density copy mode. (The application voltage is reduced.)

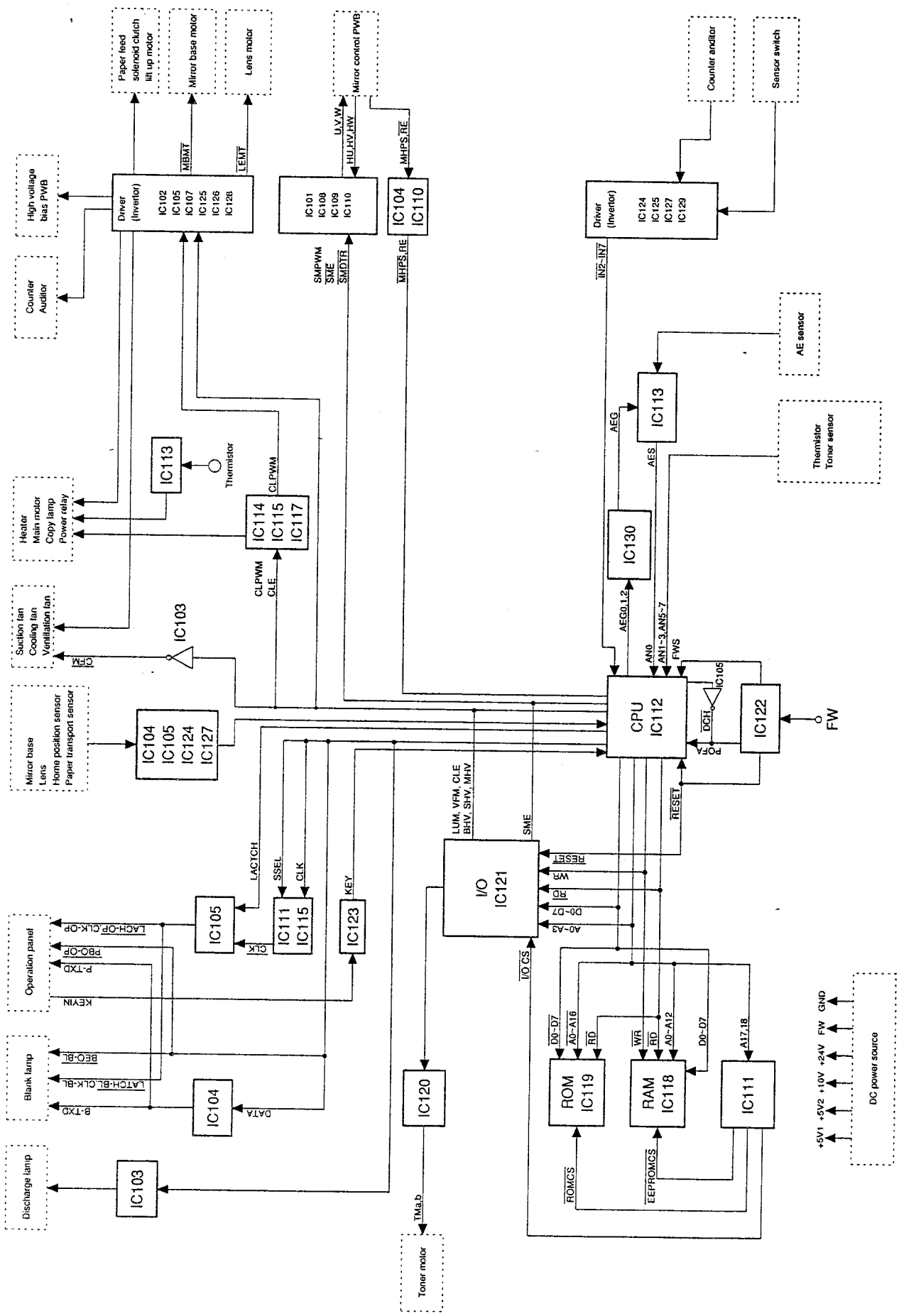
[15] ELECTRICAL SECTION

1. System Block Diagram



2. Main circuit

(1) Block diagram



(2) CPU (IC112) H8/570

① General

The CPU controls the loads of the main body and controls the system and performs sending and receiving of data in synchronization with the controller of various options through the serial data communication line.

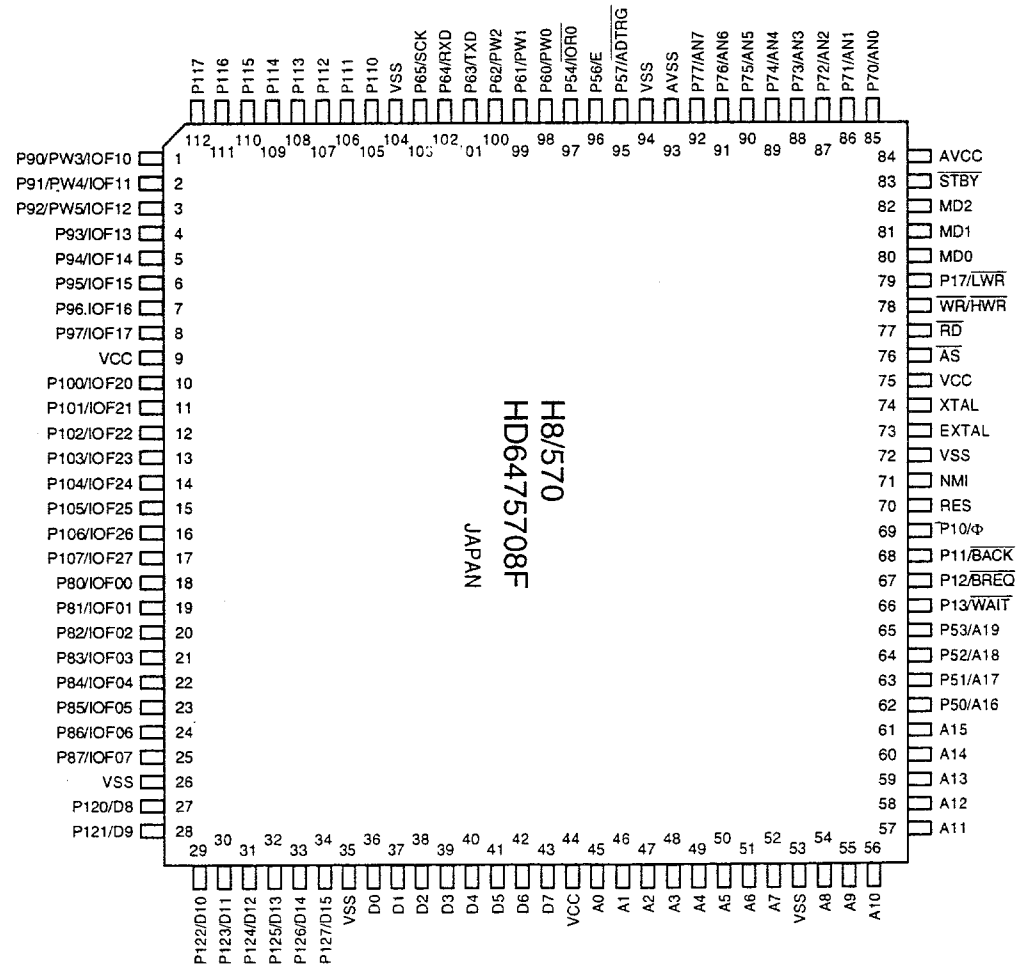
② Features

The H8/570 CPU includes the ISP (Intelligent Sub Processor) which allows programming, performs the commands at high speeds, strengthening the normal functions of timer function and serial communication. It is a single chip microprocessor.

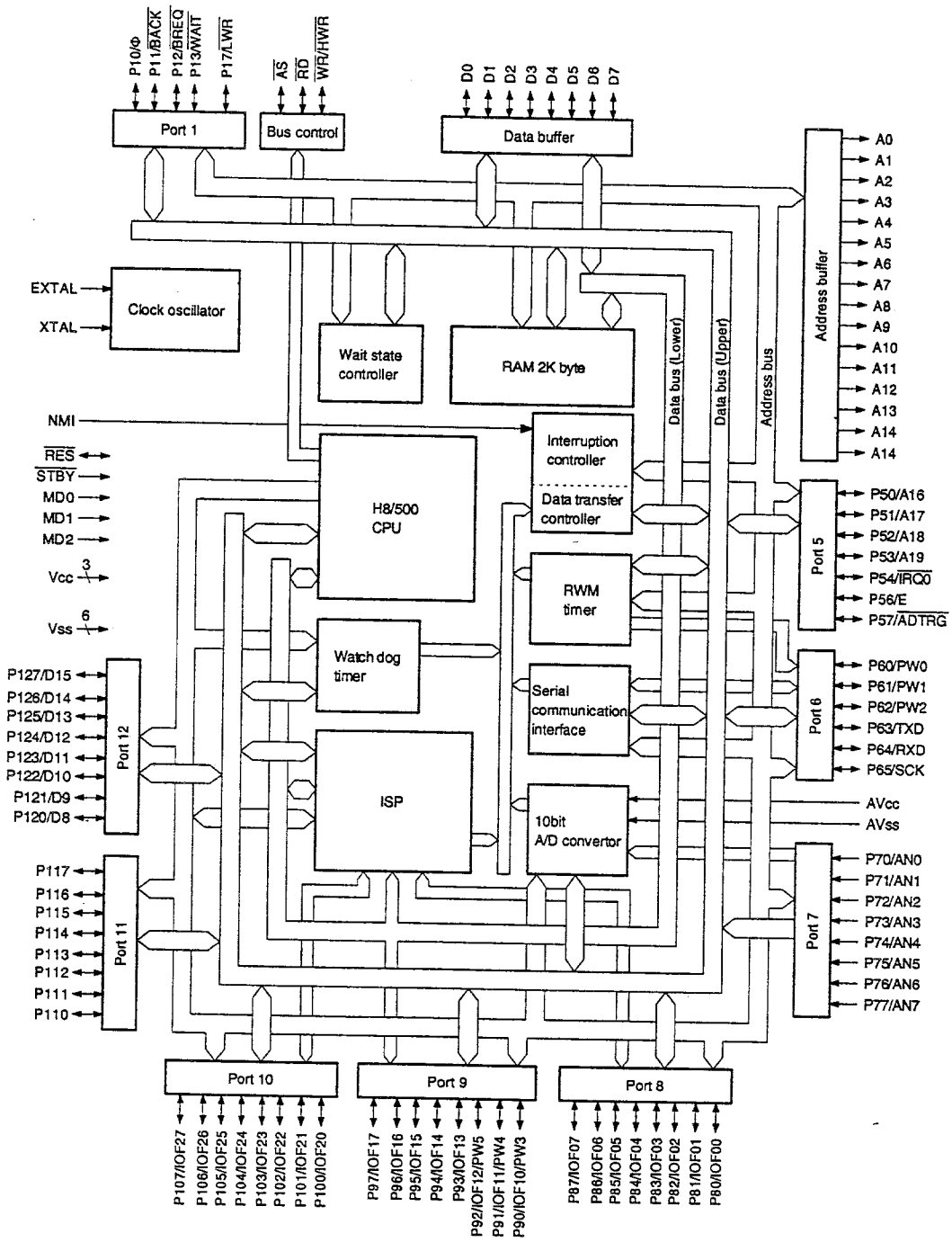
Major functions

- ISP (EPROM built-in)
- SCI (Serial communication interface)
- PWM timer (Pulse wide modulator)
- A/D convertor
- Watch dog timer
- I/O port
- RAM with 2K byte memory

③ Pin arrangement



④ Internal block diagram



⑤ CPU (IC112) pin signal

Pin No.	Port	Signal name	I/O	H/L	Specifications
1	P90	LEMT0	OUT	H	Lens motor drive signal A
2	P91	LEMT1	OUT	H	Lens motor drive signal B
3	P92	LEMT2	OUT	H	Lens motor drive signal -A
4	P93	LEMT3	OUT	H	Lens motor drive signal -B
5	P94	CLK	OUT	H	Clock signal for data output to BL.OPPWB
6	P95	DATA	OUT	H	Serial data output to BL.OPPWB
7	P96	BSPWM	OUT	H	High voltage unit bias level control pulse
8	P97	CLPWM	OUT	H	Copy lamp light quantity control pulse
9	VCC	+5V2			Power source (5V)
10	P100	FWS	IN	H	Power frequency detection signal (AC waveform zero cross timing)
11	P101	KEY	IN	H	Operation PWB key input signal (Serial data)
12	P102	NC			
13	P103	RE	IN	H	Pulse signal generated by mirror motor rotation
14	P104	$\overline{\text{MHPS}}$	IN	L	Optical unit home position sense signal
15	P105	NC			
16	P106	$\overline{\text{R-TXD}}$	OUT	L	Serial data output to RIC (Not used)
17	P107	$\overline{\text{R-RXD}}$	IN	L	Serial data input from RIC (Not used)
18	P80	CPFS1	OUT	H	Upper tray paper feed solenoid control signal
19	P81	CPFS2	OUT	H	Lower tray paper feed solenoid control signal
20	P82	CPFC1	OUT	H	Upper tray paper feed clutch control signal
21	P83	CPFC2	OUT	H	Lower tray paper feed clutch control signal
22	P84	MBMT0	OUT	H	No. 4/5 mirror base motor drive signal A
23	P85	MBMT1	OUT	H	No. 4/5 mirror base motor drive signal B
24	P86	MBMT2	OUT	H	No. 4/5 mirror base motor drive signal -A
25	P87	MBMT3	OUT	H	No. 4/5 mirror base motor drive signal -B
26	VSS	GND			Power source (GND)
27	P120	SMDIR	OUT	H	Mirror motor feed return change-over signal
28	P121	AUDCL	OUT	H	Auditor time out clear signal
29	P122	AUDCP	OUT	H	Auditor copying signal
30	P123	PNC	OUT	H	Personal counter control signal
31	P124	MPFS	OUT	H	Manual paper feed solenoid control signal
32	P125	RRC	OUT	H	Resist roller clutch drive signal
33	P126	TRC	OUT	H	Transport roller clutch drive signal
34	P127	PSPS	OUT	H	Paper separation solenoid control signal
35	VSS	GND			Power source (GND)
36	D0	D0			Data signal
37	D1	D1			Data signal
38	D2	D2			Data signal
39	D3	D3			Data signal
40	D4	D4			Data signal
41	D5	D5			Data signal
42	D6	D6			Data signal
43	D7	D7			Data signal
44	VCC	+5V2			Power source (GND)
45	A0	A0			Address signal
46	A1	A1			Address signal
47	A2	A2			Address signal
48	A3	A3			Address signal
49	A4	A4			Address signal
50	A5	A5			Address signal
51	A6	A6			Address signal
52	A7	A7			Address signal
53	VSS	GND			Power source (GND)
54	A8	A8			Address signal
55	A9	A9			Address signal
56	A10	A10			Address signal

Pin No.	Port	Signal name	I/O	H/L	Specifications
57	A11	A11			Address signal
58	A12	A12			Address signal
59	A13	A13			Address signal
60	A14	A14			Address signal
61	A15	A15			Address signal
62	A16	A16			Address signal
63	A17	A17			Address signal
64	A18	A18			Address signal
65	A19	A19			Address signal (Not used)
66	P13	PPD1	IN	H	Paper transport sensor 1
67	P12	PPD2	IN	H	Paper transport sensor 2
68	P11	$\overline{\text{MBHPS}}$	IN	L	No.4/5 mirror base home position detection signal (L at HP)
69	P10	$\overline{\text{LHPS}}$	IN	L	Lens home position detection signal (L at HP)
70	$\overline{\text{RES}}$	$\overline{\text{RESET}}$	IN	L	Reset state at LOW (0V).
71	NMI	POFA	IN	H	Low with stable power voltage.
72	VSS	GND			Power source (GND)
73	EXTAL	EXTAL	IN		Clock (8MHz)
74	XTAL	XTAL	IN		Clock (8MHz)
75	VCC	+5V2			Power source (5V)
76	$\overline{\text{AS}}$	NC			
77	$\overline{\text{RD}}$	$\overline{\text{RD}}$	OUT	L	ROM, RAM, I/O data read signal
78	$\overline{\text{WR}}$	$\overline{\text{WR}}$	OUT	L	ROM. RAM, I/O data write signal
79	P17	NC			
80	MD0	GND	IN	L	Operation mode, control signal
81	MD1	+5V2	IN	H	Operation mode, control signal
82	MD2	+5V2	IN	H	Operation mode, control signal
83	$\overline{\text{STBY}}$	+5V2	IN	H	Hardware standby mode signal
84	AVCC	AVCC			A/D convertor reference voltage pin
85	P70	AES (AN0)	IN		Analog input signal (AE sensor)
86	P71	TH (AN1)	IN		Analog input signal (Thermistor)
87	P72	NC			Analog input signal (Manual feed paper width sense: not used)
88	P73	TCS (AN3)	IN		Analog input signal (Toner density sensor)
89	P74	IN4	IN		Switch detection strobe signal
90	P75	IN5	IN		Switch detection strobe signal
91	P76	IN6	IN		Switch detection strobe signal
92	P77	IN7	IN		Switch detection strobe signal
93	AVSS	GND			A/D convertor ground pin
94	VSS	GND			Power source (GND)
95	P57	NC			
96	P56	NC			
97	P54	NC			
98	P60	SMPWM	OUT	H	Mirror motor speed control pulse
99	P61	SSEL	OUT	H	OP/BL select signal
100	P62	LATCH-OP	OUT	H	Latch signal of output data to the operation PWB
101	P63	LATCH-BL	OUT	H	Latch sinal of output data to BL PWB
102	P64	$\overline{\text{BEO-OP}}$	OUT	L	Operation PWB output driver ON/OFF control signal
103	P65	BEO-BL	OUT	H	BL PWB output driver ON/OFF control signal
104	VSS	GND			Power source (GND)
105	P110	PR	OUT	H	Power relay control signal
106	P111	MMPR	OUT	H	Main motor power relay control signal
107	P112	MM	OUT	H	Main motor control signal
108	P113	HL	OUT	H	Heater lamp control signal
109	P114	SFM	OUT	H	Suction fan motor control signal
110	P115	CFM	OUT	H	Cooling fan motor control signal
111	P116	DL	OUT	H	Discharge lamp control signal
112	P117	DCH	OUT	H	CPU's own reset signal

(3) I/O (IC121) UPD71055

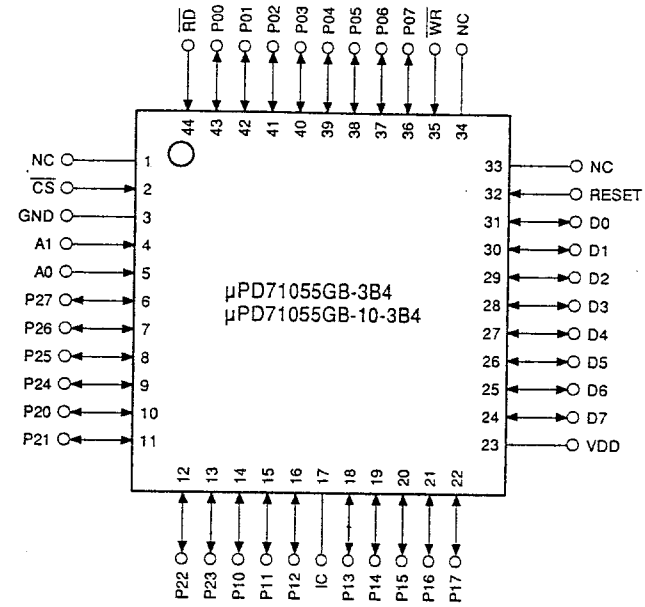
① General

The I/O converts output data of the CPU into the control signals.
The UPD71055 is a versatile-use interface element.
Three sets (8 bit) of I/O ports are provided to set I/O operations of parallel data by the program or the hardware.

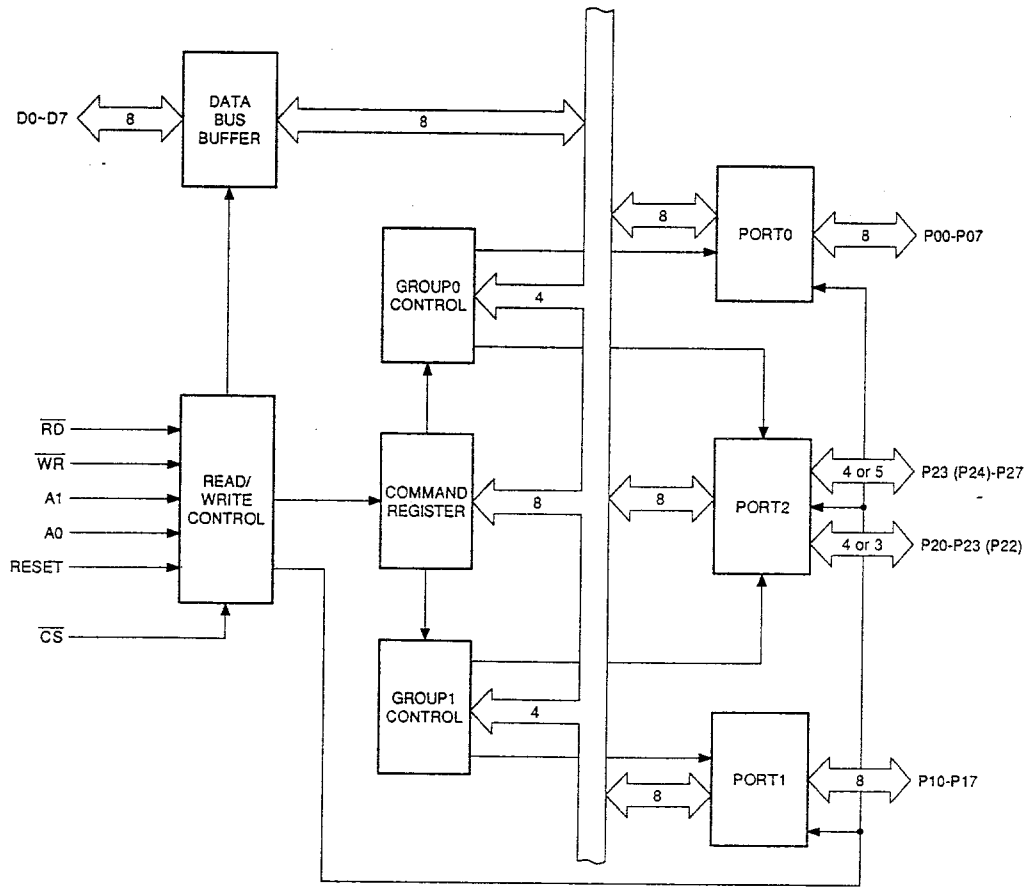
② Features

8 bit parallel I/O ports (x 3 ports)

③ Pin arrangement



④ Internal block diagram



⑤ I/O (IC121) pin signal

Pin No.	Port	Signal name	I/O	H/L	Specifications
1	NC				
2	$\overline{CS}$	$\overline{I/OCS}$	IN	L	Chip select signal
3	GND	GND			Power source (GND)
4	A1	A1	IN		Address signal
5	A0	A0	IN		Address signal
6	P27	CLE	OUT	H	Copy lamp enable signal (ON at HIGH)
7	P26	$\overline{SME}$	OUT	L	Mirror motor enable signal (ON at LOW)
8	P25	LUM2	OUT	H	Lift-up motor control signal (lower)
9	P24	LUM1	OUT	H	Lift-up motor control signal (upper)
10	P20	R-DTR	OUT		DTR for RIC (Not used.)
11	P21	R-RTS	OUT		RTS for RIC (Not used.)
12	P22	VFM1	OUT	H	Ventilation fan motor control signal 1
13	P23	VFM2	OUT	H	Ventilation fan motor control signal 2
14	P10	MHV	OUT	H	Main charger high voltage output control signal
15	P11	THV	OUT	H	Transfer charger high voltage output control signal
16	P12	SHV	OUT	H	SEparation charger high voltage output control signal
17	IC				
18	P13	EX1	OUT	H	Reserved.
19	P14	GRSEL0	OUT	H	Grid bias control signal 0
20	P15	GRSEL1	OUT	H	Grid bias control signal 1
21	P16	TMa	OUT	H	Toner supply motor drive signal
22	P17	TMb	OUT	H	Toner supply motor drive signal
23	VDD	+5V2			Power source (5V)
24	D7	D7	IN		Data signal
25	D6	D6	IN		Data signal
26	D5	D5	IN		Data signal
27	D4	D4	IN		Data signal
28	D3	D3	IN		Data signal
29	D2	D2	IN		Data signal
30	D1	D1	IN		Data signal
31	D0	D0	IN		Data signal
32	RESET	RESET	IN	H	Reset signal
33	NC				
34	NC				
35	$\overline{WR}$	$\overline{WR}$	IN	L	Data write signal
36	P07	AEG2	OUT	H	AE gain select signal
37	P06	AEG1	OUT	H	AE gain select signal
38	P05	AEG0	OUT	H	AE gain select signal
39	P04	NC			
40	P03	NC			
41	P02	WSLC	OUT	H	Switch detection strobe select signal
42	P01	WSLB	OUT	H	Switch detection strobe select signal
43	P00	WSLA	OUT	H	Switch detection strobe select signal
44	$\overline{RD}$	$\overline{RD}$	IN	L	Data read signal

(4) RAM (IC118) X28C64

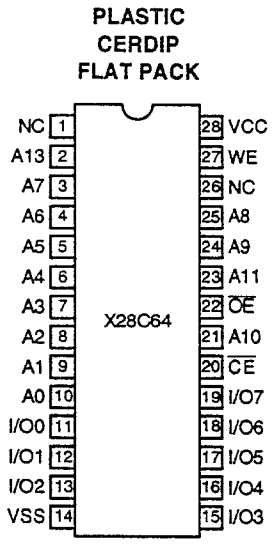
① General

The RAM stores various set data necessary for the SF-1025 system operations and counter data such as paper jam causes or trouble codes (without batteries). After turning on/off the power, data are transmitted between the RAM and the main CPU.
The X28C64 is an 8KByte EEPROM (Electrically Erasable PROM) and operates on a single power of 5V.

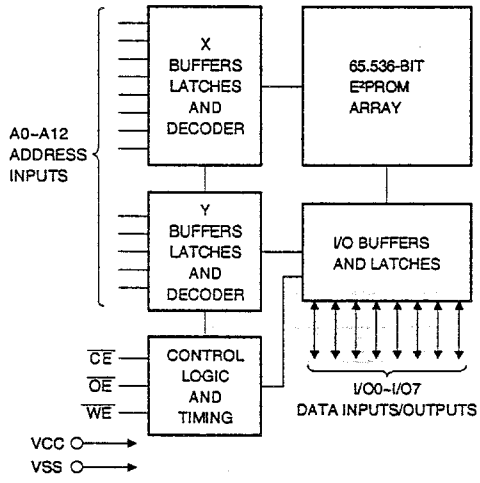
② Features

Low power CMOS operating current: Max. 60mA
All memory write time: Average 0.625sec

③ Pin arrangement



④ Internal block diagram



⑤ RAM (IC118) pin signal

Pin No.	IN/OUT	Signal name	Function
1	—	nc	
2	IN	A12	Address signal
3 〜 10	IN	A7 〜 A0	Address signal
11 〜 13	IN/OUT	I/O0 〜 I/O2	Data signal
14	—	GND	GND (0V)
15 〜 19	IN/OUT	I/O3 〜 I/O7	Data signal
20	IN	$\overline{CS}$	RAM chip select signal. RAM is selected at LOW (0V).
21	IN	A10	Address signal
22	IN	$\overline{RD}$	Read signal. RAM data are read into CPU at LOW level.
23	IN	A11	Address signal
24	IN	A9	Address signal
25	IN	A8	Address signal
26	IN	NC	
27	IN	$\overline{WR}$	Write signal. Data are written from CPU to RAM at LOW level (0V).
28	—	5V	Power source

⑥ Backup data list

Item	Set program No.	Content
Counter	21-01	Maintenance preset counter setting
	22-01	Maintenance counter
	22-03	JAM memory (Max. 50 pcs.)
	22-04	Total JAM counter
	22-05	Total counter
	22-06	Mini maintenance counter (3 colors)
	22-07	Mini maintenance preset counter
Simulation set value	25-02	Automatic developer adjustment value
	25-03	Preliminary rotation timer set value
	26-03	Counter mode setting/Timer automatic clear setting
	26-06	Destination setting
	26-07	Drum sensitivity setting
	26-08	Lens focus setting
	26-09	No. 4/5 mirror characteristics setting
	26-11	Time out clear time set value
	43	Fusing temperature setting
	46-01	Exposure level adjustment
	47	AE sensor characteristics measurement value
	48-01	Front/rear magnification ratio adjustment
	48-02	Paper transport direction magnification ratio adjustment
	50-01	Lead edge image position adjustment
	50-02	Lead edge image position adjustment
	51-02	Resist quantity adjustment
	51-05	Frame erase adjustment

(5) Decoder (IC111)

① General

IC111 is composed of two sets of independent binary-quaternary decoders.

IC111A:

Enable	Select		Output		
GND	A17	A18	ROMCS	$\overline{I/OCS}$	$\overline{EEPROMCS}$
L	L	L	L	H	H
L	H	L	H	L	H
L	L	H	H	H	L

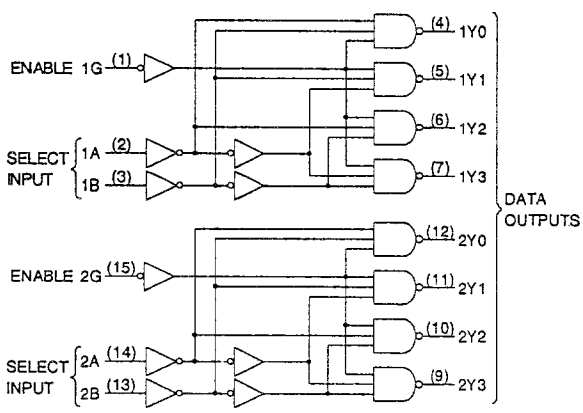
Chip select signal is outputted with address data (A17, 18).

IC113B:

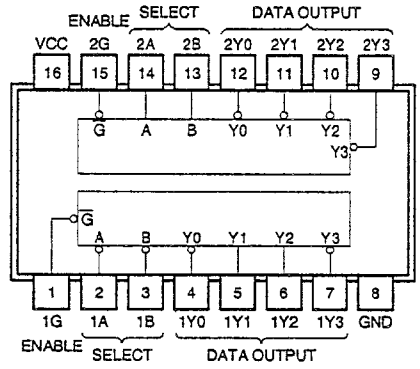
Enable	Select		Output	
$\overline{CLK}$	SSEL	GND	CLK-OP	CLK-BL
L	L	L	L	H
L	H	L	H	L

With select signal (SSEL), clock signal is outputted to the driver IC in the operation PWB and the blank lamp PWB.

② Internal logic diagram



③ Pin connection


ENABLE
SELECT
DATA OUTPUT
VCC 2G 2A 2B 2Y0 2Y1 2Y2 2Y3
16 15 14 13 12 11 10 9
G A B Y0 Y1 Y2 Y3
G A B Y0 Y1 Y2 Y3
1 2 3 4 5 6 7 8
1G 1A 1B 1Y0 1Y1 1Y2 1Y3 GND
ENABLE
SELECT
DATA OUTPUT

④ Operations

When this is used as a decoder, if input 1A and 1B are specified with 2-bit binary codes, one of the outputs corresponding to the value becomes LOW and the other three outputs become HIGH. At that time, enable input E (15 pin, 1 pin) is kept at LOW. When E (15 pin, 1 pin) is HIGh, all outputs become HIGH regardless of DA and DB.

1G	1B	1A	1Y0	1Y1	1Y2	1Y3
H	X	X	H	H	H	H
L	L	L	L	H	H	H
L	H	L	H	H	L	H
L	H	H	H	H	H	L

Note 1: X: HIGH or LOW.

(6) Start/stop control circuit

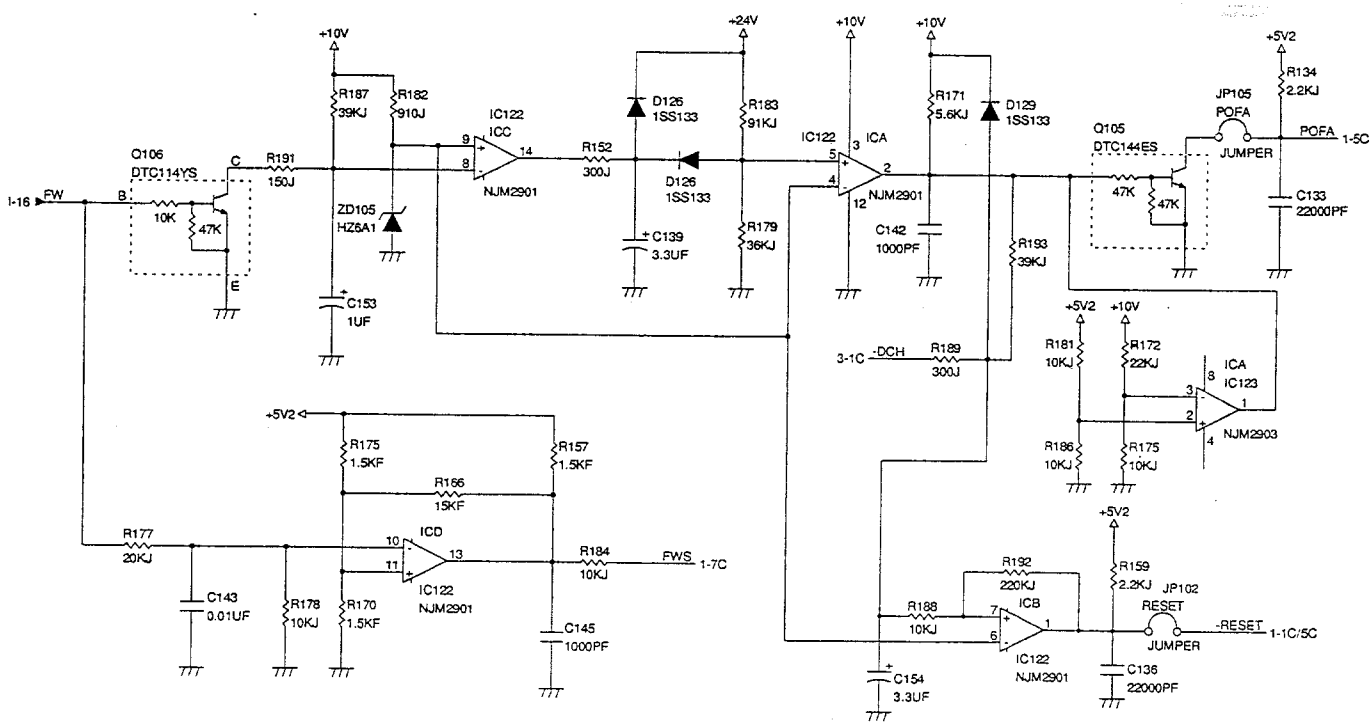
① General

The circuit senses ON/OFF state of the power source to control start/stop of the circuits.
The DC power PWB supplies power voltages (VB=+24V, VC=+10V, VD1=5V, VD2=5V).
After the power voltage reaches the specified level, the circuit operation is started. Before the power voltage falls below the specified level, the circuit operation is stopped, preventing against malfunctions.

② Operation

Ⓐ POFA generating circuit (Power voltage sense circuit)

This circuit senses ON/OFF of the power source and the power voltage. The DC power voltage is unstable immediately after turning on the power, or when the AC input voltage is abnormally low, or in the transition period after turning off the power.
When the DC voltage falls below the specified level, the circuits do not work properly. Especially when the power is turned on/off, data transmission is performed between the EEPROM (IC118) and the CPU (IC112). If, in this case, VD (+5V) power voltage if low, data transmission is not performed properly.
To protect against this malfunction, on/off of the power is sensed by this circuit and informed to the CPU so that the CPU starts data transmission with the RAM and the operations of each circuit and that it completes data transmission with the EEPROM and stops the operations of each circuit before the DC power voltage falls below the machine operation disable level. (Data transmission between the CPU and the EEPROM is allowed if only VD2 (+5V2) does not fall.)
Signal POFA is used to inform the CPU of on/off of the power and the DC power voltage state. POFA is driven HIGH to turn off the power when the DC power voltage becomes higher than the specified level. POFA is driven LOW just before the DC power voltage becomes low (0V).

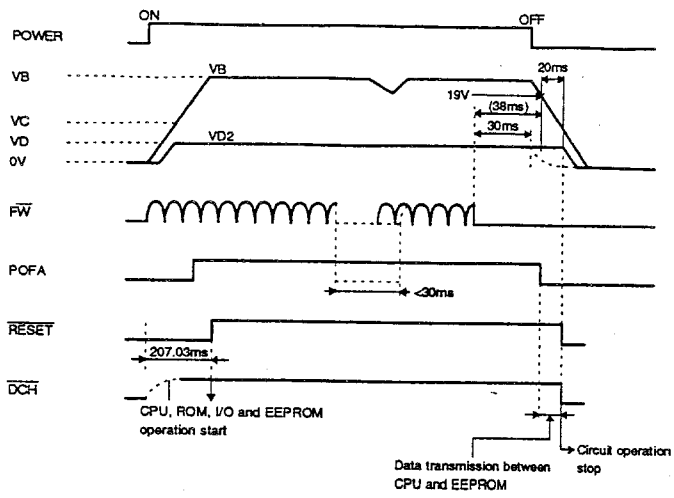


Ⓑ $\overline{\text{RESET}}$ generating circuit

$\overline{\text{RESET}}$ signal is formed with the power voltage sense signal (POFA) and the data transmission complete signal ($\overline{\text{DCH}}$) outputted from the CPU, and is used to operate each circuit in the stable range of the DC power voltage.

$\overline{\text{RESET}}$ signal is set (operation enabled) when POFA becomes HIGH (+5V), and is reset (operation stopped) when $\overline{\text{DCH}}$ becomes LOW (0V).

When POFA becomes LOW, data are transmitted from the CPU to the EEPROM. After completion of the data transmission, $\overline{\text{DCH}}$ becomes LOW.



Ⓒ Operation at power on

- When the power is turned on, FW rises to turn on the collector and the emitter of Q106 so that IC122 8 pin voltage becomes about 0.736V which is lower than 9 pin voltage (ZD105 5.2 ~ 5.5V). As a result, 14 pin is opened.
- 24V rises about 16msec after FW rising. C139 is charged through R183 and D128. IC122 5 pin voltage becomes higher than the reference voltage IC122 4 pin (ZD103 5.2 ~ 5.5V) in about 95msec so that 2 pin (POFA) becomes high.

Ⓓ Operation at power off

- When the power is turned off, FW falls to open the collector and the emitter of Q106. C153 is charged through R187. IC122 8 pin voltage becomes higher than 9 pin (ZD105 5.2 ~ 5.5V) in about 30msec. As a result, 14 pin becomes low.
- When IC122 14 pin becomes low, C139 is discharged and 5 pin voltage becomes about 0.8V which is lower than 4 pin (ZD103 5.2 ~ 5.5V). As a result, 2 pin (POFA) becomes low.

Ⓔ Operations at an instantaneous service interruption

Since POFA signal is outputted by IC122, it may erroneously outputted by discrepancy of resign times of 5V and 10V. To prevent against this, power voltages of 5V and 10V are monitored by R172, 176, 181, 186, and IC123.

- When the power is turned off, POFA should be driven low (0V) at the early stage. If it is driven low too early, however, the machine stops its operation even at an instantaneous service interruption (less than 30msec) which will not obstruct machine operation in normal cases. Therefore, off state of AC power for more than 30msec is judged as power OFF in this circuit and $\overline{\text{POFA}}$ is driven low.
- In normal operations, IC122 8 pin is at LOW level. At an instantaneous service interruption, FW becomes LOW to open the collector and the emitter of Q106, charging C153 through R187. So it takes more than 30msec for IC122 8 pin voltage to rise above the reference voltage (IC122 9 pin, 5.2V ~ 5.5V), and the machine does not stop at an instantaneous service interruption of 30msec or less.

Ⓕ Operations when the power voltage falls

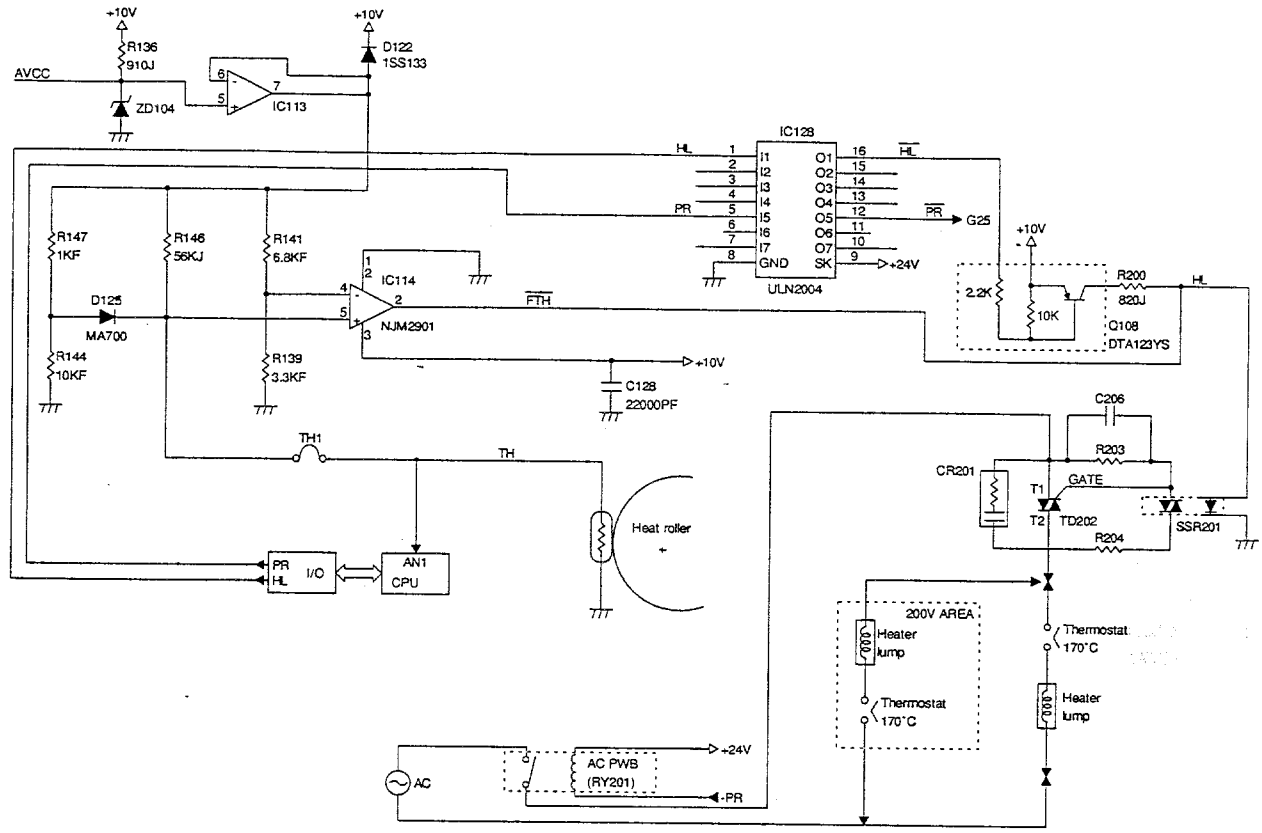
- When the AC power voltage falls below a certain level, the DC power voltage also falls though the DC power circuit is a regulator circuit.

  Therefore, 24V is monitored and when it falls to 19V, $\overline{\text{POFA}}$ is driven low (0V). (When it falls below 19V, IC122 5 pin voltage becomes lower than 4 pin reference voltage because of voltage division by R183 and R179. As a result, the output of comparator (IC122) becomes low.)

(7) Heater lamp control circuit

① General

The heater lamp control circuit detects the heat roller surface temperature with the thermistor, converts it into voltage level, and outputs it to the CPU analog input pin.
The CPU converts the analog voltage into digital signal level, compares it with the value set by test commands, turns on/off the heater lamp according to the level, and maintain the heat roller surface temperature at a constant level.
When a paper jam occurs in the SF-1025, this control circuit operates for max. 3 min to shorten the jam recovery time (8 sec).



When the heat roller surface temperature is low, the thermistor resistance increases. When the surface temperature is high, the resistance decreases. The thermistor terminal voltage, therefore, increases when the heat roller surface temperature is low, and decreases when the temperature is high. The thermistor terminal voltage is inputted to the CPU analog port, and the CPU controls on/off of the heater lamp with the input voltage level.

[High temperature protecting circuit in hung up of the CPU]

The voltage at IC114 3 pin (reference voltage) is divided by R139 and R141, and the thermistor terminal voltage is applied to IC114 2 pin.
When 2 pin voltage is lower than 3 pin voltage (the heat roller surface temperature: about 230 degree C), output pin 1 becomes HIGH and IC114 2 pin becomes LOW. As a result, HL signal is pulled to the GND level and the heater lamp lighting signal is not generated. (IC114 output 2 pin is normally HIGH (Open state).)

[When the heat roller surface temperature is lower than the set temperature]

a. Since the thermistor pin voltage is higher than the set level, output signal HL from the CPU becomes HIGH.

b. HL signal is passed through IC128, TR, and Q108 to the solid state relay.
When, therefore, HL signal is LOW, the internal triac turns on.

c. When the internal traic turns on, a pulse is applied to the gate of the external triac to allow a current to flow from the power source through the heater lamp to the triac, thus lighting the heater lamp.

[When the heat roller surface temperature is higher than the set temperature]

a. Since the thermistor pin voltage is lower than the set level, output signal HL from the CPU becomes low.

b. HL becomes low, SSR is turned off, the external triac is turned off, and the heater lamp is turned off.

[Q108]

Q108 protects the heater lamp from lighting due to trouble in the harness of the heater lamp drive signal.

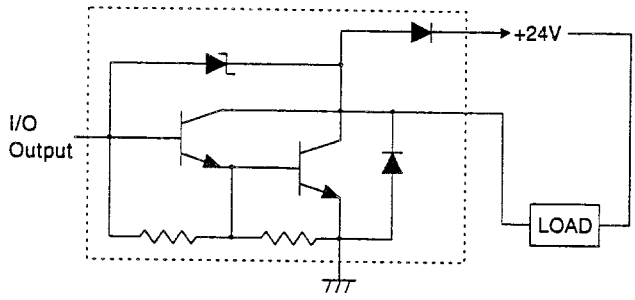
(8) Driver circuit (Solenoid, magnetic clutch)

① General

The control signals of each load outputted from the CPU and I/O cannot drive the load directly. The output, therefore, is delivered to the load through the driver IC.

② Operation

The driver circuit forms a Darlington circuit with two transistors to obtain a large drive current (load current) from a small input current (I/O output current). When the driver input voltage is HIGH (+5V), the transistor is turned on to flow a current in the arrow direction, operating the load. When the driver is turned on, the driver output pin voltage is 0V.

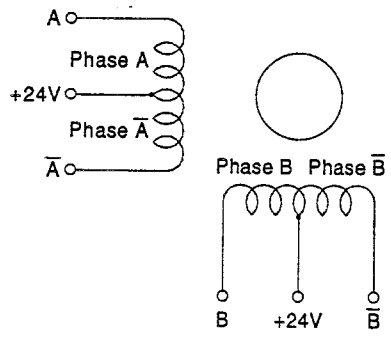


(9) Stepping motor drive circuit

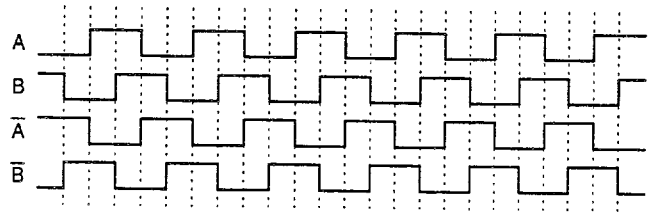
① General

The driver circuit drives the lens drive motor, the mirror base drive motor, the automatic duplex copy tray, the side plate motor, and the rear plate motor.

A: Stepping motor phase A coil drive signal
B: Stepping motor phase B coil drive signal
A: Stepping motor phase A coil drive signal
B: Stepping motor phase B coil drive signal



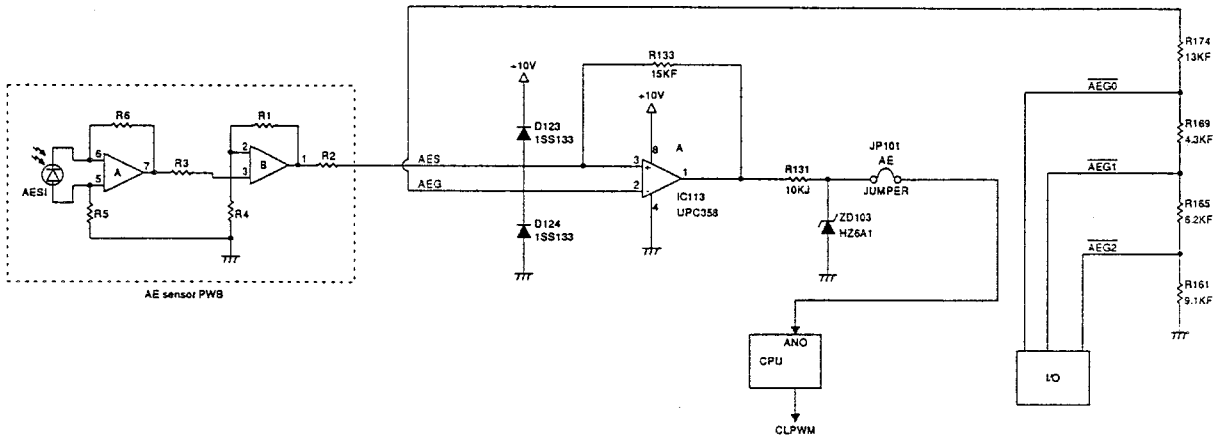
Stepping motor time chart



Drive signal	Lens drive	Mirror base drive	For Side plate	For rear plate
A	LEMT0	MBMT0	PAM1-0	PAM2-0
B	LEMT1	MBMT1	PAM1-1	PAM2-1
C	LEMT2	MBMT2	PAM1-2	PAM2-2
B	LEMT3	MBMT3	PAM1-3	PAM2-3

(10) AE (Auto Exposure) sensor circuit

The AE circuit is composed of the AE sensor PWB which is composed of the photo diode, the I-V convertor circuit, and the amplifier circuit, and the amplifier circuit on the control PWB.



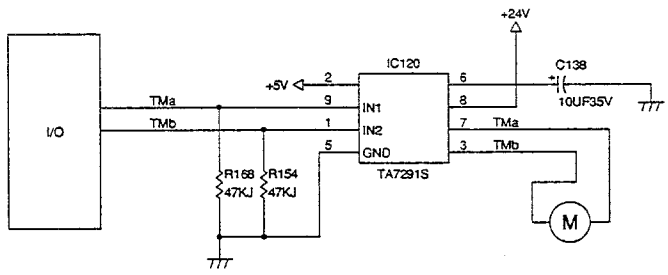
Operation amplifier A performs I-V conversion of the original density level (minute current) from the sensor. Operation amplifiers B and C amplify the output of operation amplifier A to a suitable level for inputting to the CPU.

The amplifying level is automatically set by selecting the AE gain signal ($\overline{AEG0}$ ~ $\overline{AEG2}$) outputted from the I/O chip when test command SIM 47 is executed.

AE operation is performed by the software in the control PWB. When a reflected ray enters the sensor, a voltage corresponding to the light quantity is inputted to the CPU. The CPU compares the input voltage and the copy lamp application voltage and controls the copy lamp voltage so that the exposure level corresponds to the original density.

(11) Toner supply motor drive circuit

IC104 is the motor control IC which drives the toner supply motor with the pulse signals (TMa, TMb) outputted from the I/O chip.

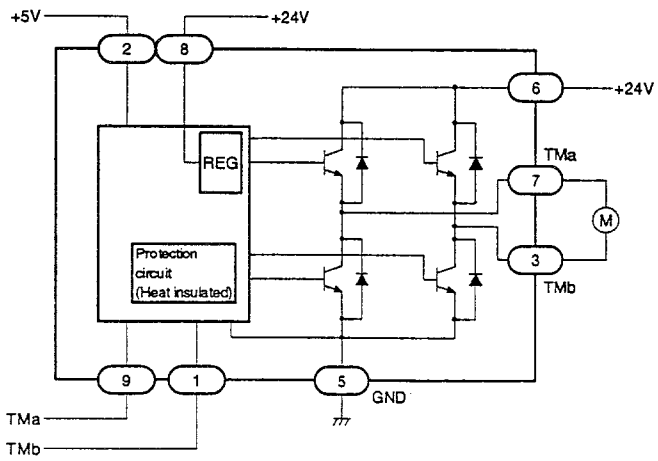


Truth value table

Input		Output		Mode
TMa	TMb	TMa	TMb	
L	L	∞	∞	Stop
H	L	H	L	CW/CCW
L	H	L	H	CCW/CW
H	H	L	L	Brake

∞high impedance

Internal circuit



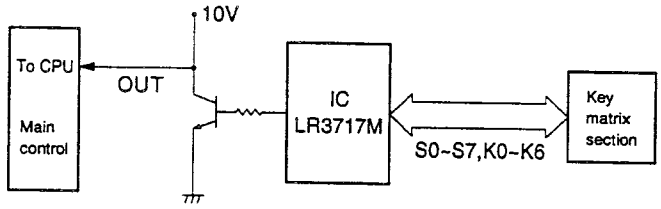
3. Operation circuit

General

- The operation circuit is composed of the key matrix circuit and the display circuit.

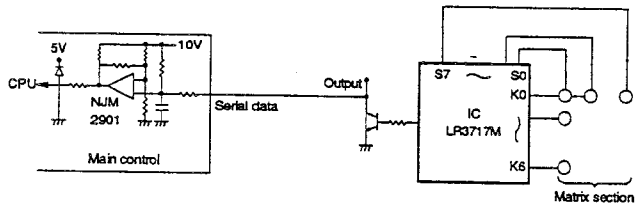
<Key circuit>

(1) Block diagram

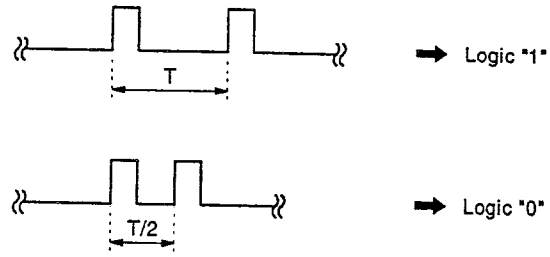


(2) Key detection

Key detection is performed by the key detection IC (LR3717M) with matrix of S0 ~ S7 and K0 ~ K6. Information is set to the CPU by serial data transmission. (& x 8 matrix available)



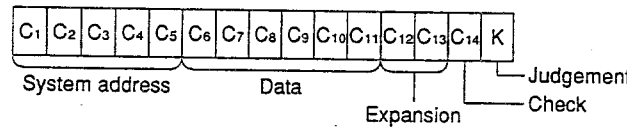
The transmission system is PPM (Pulse Position Modulation) system using 15 bit data pulse signals.
The PPM transmission makes distinction of pulse width as logic "1" or logic "0."



As shown above, when the pulse interval is T, the pulse is judged as logic "1," and when the pulse interval is T/2, it is judged as logic "0."
Pulse signals of 15 bits are serially sent.
PPM signal is judged from pulse interval "t" as shown below:

When t < 0.4 m : Abnormal
When 0.4 ms < t < 1.6 ms: "0"
When 1.6 ms < t < 3.2 ms: "1"
When 3.2 ms < t : Abnormal

When any abnormal signal enters the circuit, all the bits are cleared. Then the operation starts from the first bit again.
When data of more than 16 bits (17 pulse or more) are inputted, it is judged as an abnormal signal and all the bits are cleared. Then the operation begins from the first bit again.
The 15 bit data assignment is as shown below:



Ⓐ System address (Refer to ✳1.) C1, C2, C3, C4, C5
These data are set with the switches and assigned depending on the system. 56 channels and 2 bit expansion are available for sending commands for one system.

✳1: System address
This bit is set to prevent against malfunction in wireless communication with other devices (VTR, TV, etc.). For this time, communication is made through wires and there is no need to set this bit. Set to "0."

Ⓑ Data C6, C7, C8, C9, C10, C11
These data are assigned with the key input. Commands corresponding to C6 ~ C11 are as shown below:

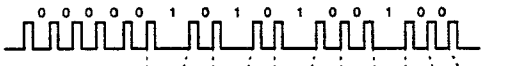
C6	C7	C8	C9	C10	C11	CH	C6	C7	C8	C9	C10	C11	CH	C6	C7	C8	C9	C10	C11	CH	C6	C7	C8	C9	C10	C11	CH
1	0	0	0	0	0	1	0	0	0	0	1	0	16	1	1	1	1	1	0	31	0	1	1	1	0	1	46
0	1	0	0	0	0	2	1	0	0	0	1	0	17	0	0	0	0	0	1	32	1	1	1	1	0	1	47
1	1	0	0	0	0	3	0	1	0	0	1	0	18	1	0	0	0	0	1	33	0	0	0	0	1	1	48
0	0	1	0	0	0	4	1	1	0	0	1	0	19	0	1	0	0	0	1	34	1	0	0	0	1	1	49
1	0	1	0	0	0	5	0	0	1	0	1	0	20	1	1	0	0	0	1	35	0	1	0	0	1	1	50
0	1	1	0	0	0	6	1	0	1	0	1	0	21	0	0	1	0	0	1	36	1	1	0	0	1	1	51
1	1	1	0	0	0	7	0	1	1	0	1	0	22	1	0	1	0	0	1	37	0	0	1	0	1	1	52
0	0	0	1	0	0	8	1	1	1	0	1	0	23	0	1	1	0	0	1	38	1	0	1	0	1	1	53
1	0	0	1	0	0	9	0	0	0	1	1	0	24	1	1	1	0	0	1	39	0	1	1	0	1	1	54
0	1	0	1	0	0	10	1	0	0	1	1	0	25	0	0	0	1	0	1	40	1	1	1	0	1	1	55
1	1	0	1	0	0	11	0	1	0	1	1	0	26	1	0	0	1	0	1	41	0	0	0	1	1	1	56
0	0	1	1	0	0	12	1	1	0	1	1	0	27	0	1	0	1	0	1	42							
1	0	1	1	0	0	13	0	0	1	1	1	0	28	1	1	0	1	0	1	43							
0	1	1	1	0	0	14	1	0	1	1	1	0	29	0	0	1	1	0	1	44							
1	1	1	1	0	0	15	0	1	1	1	1	0	30	1	0	1	1	0	1	45							

Ⓒ Data expansion C12, C13
These are set with the switches and used to expand commands.

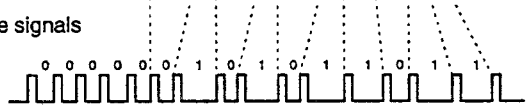
Ⓓ Data judgment K (Refer to *2.)
The last bit is for judgement of data transmission system. Date are transmitted as follows by using this bit.

*2: Data judgment
The data are not reversed in this case.

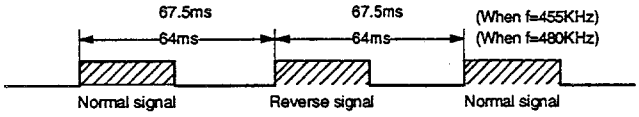
(a) Normal signals



(b) Reverse signals



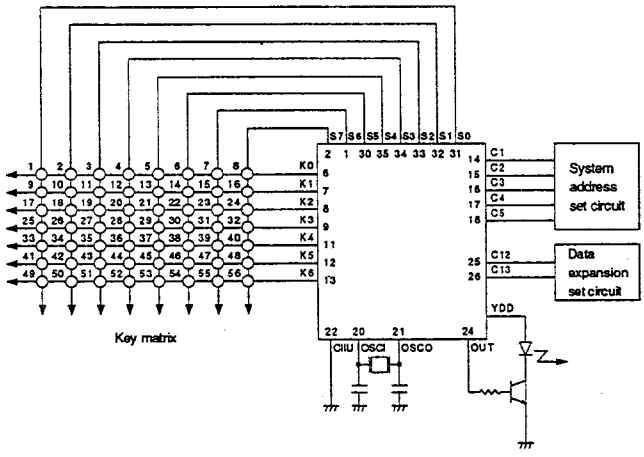
When the data judgment bit is "0," normal signals are transmitted. When it is "1," the reverse signals of C0 ~ C14 and K are transmitted.



As shown above, normal signals and reverse signals are repeated in series in a certain cycle. In the receiver side, judgment between normal and reverse signals is performed with the data judgement bit to form data properly.

Ⓔ Check bit C14
C14 is fixed to GND in the LSI and no pin is provided in the package.

(3) System configuration



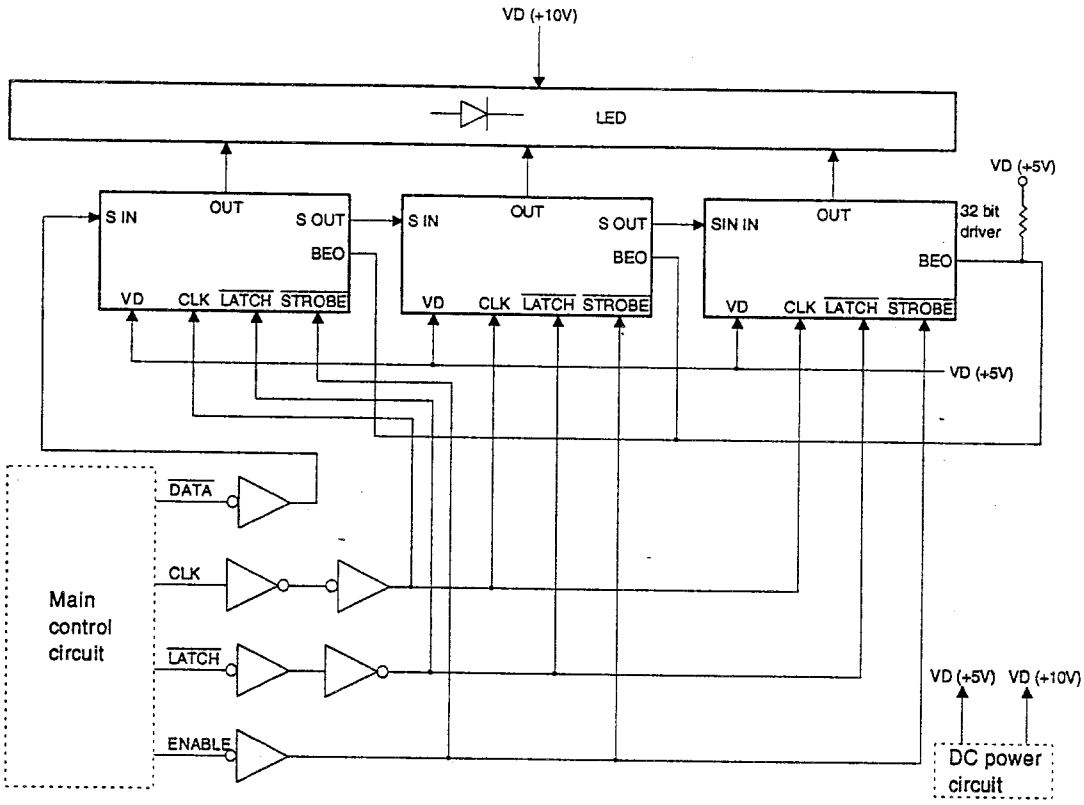
When command [3] is sent, for example, press the key at the intersection between K0 and S2. The 15 bit data at that time is as follows:

[3] 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0
System address bit Data bit

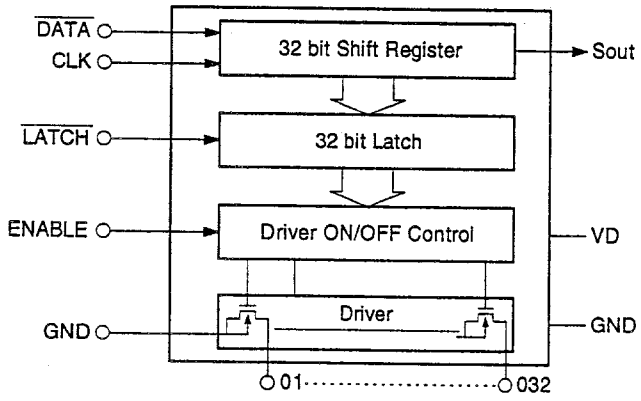
<Display circuit>

This circuit is controlled with the data signal and the control signal from the main control circuit.

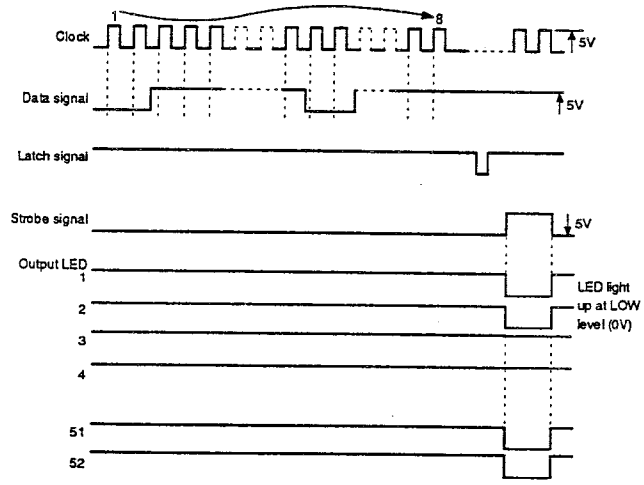
(1) Block diagram



32 bit driver block diagram



(2) Operational description



Data signals (8 bit) sent from the main control PWB are shifted at the rising timing of the clock and retained at the resign timing of the latch signal.

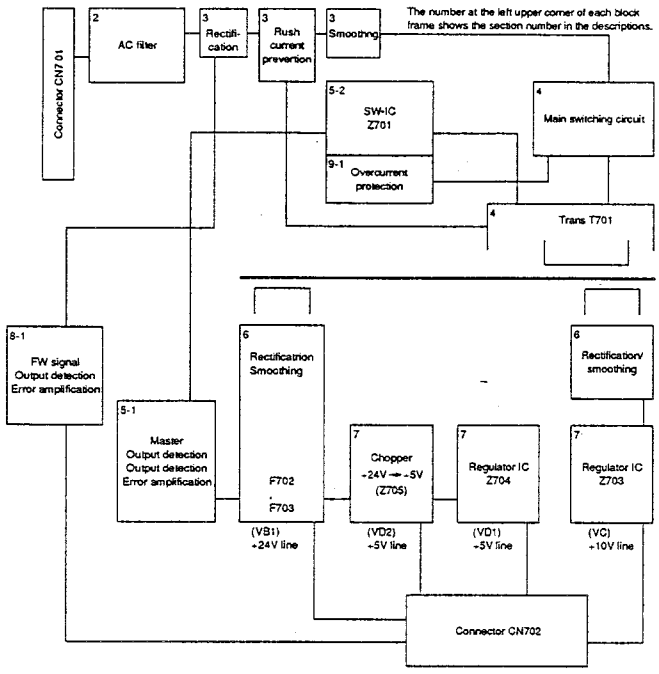
The retained data are outputted when STROBE signal becomes HIGH (5V), lighting the LED.

4. DC power circuit

(1) General

This power circuit (CPWBF1063FC31/CPWBF1063FC32) has been developed as a power circuit for copiers. (The descriptions are based on the 100V system.)
When a specified AC input is applied to the circuit, DC outputs in 4 systems (+24V (VB1), +10V (VC), +5V(VD1 & VD2)) are outputted.
The circuit system is the excitation flyback convertor output system.

The block diagram of the power circuit is shown below:


The number at the left upper corner of each block frame shows the section number in the descriptions.
Connector CN701
2 AC filter
3 Rectification
3 Rush current prevention
3 Smoothing
5-2 SW-IC Z701
4 Main switching circuit
9-1 Overcurrent protection
4 Trans T701
8-1 FW signal Output detection Error amplification
5-1 Master Output detection Output detection Error amplification
6 Rectification Smoothing
F702
F703
7 Chopper -24V → -5V (Z705)
7 Regulator IC Z704
6 Rectificationv smoothing
7 Regulator IC Z703
(VB1) +24V line
(VD2) +5V line
(VD1) +5V line
(VC) +10V line
Connector CN702

(2) AC input section (Filter etc.)

After passing fuse F701, the input goes through the input filter (two-step LC filters) to reduce common mode noises and normal mode noises entering from the AC line.
The first step LC filter is composed of across-the-line capacitor C702, common mode choke coil L701, and line bypass capacitors C709 and C710. The second step LC filter is composed of across-the-line capacitor C716 and common mode choke coil L702.
Fuse F701 in the AC line is provided for protection against an abnormal current which shuts off the circuit.

(3) Rectifying, rush prevention, smoothing circuit section

This section converts an AC input into a DC output (instable state), and is composed of the rectifying section, the rush prevention section, and the smoothing section in this order. Since the obtained DC output serves as the input for the excitement system convertor, it must be kept at low impedance. The rectifying and smoothing system is the full-wave rectification type capacitor input system by means of diode bridge RC701 and electrolytic capacitors C703 and C705.
The rush current prevention is to prevent against a smoothing capacitor charging current (or rush current generated in the AC line) generated at turning ON of the AC input because of the capacitor input system of rectifying and smoothing. When the AC input is turned ON, the rush current is limited by current limiting resistor R710 and the smoothing capacitor is charged. When the specified voltage is reached, the excitement convertor operates to provide a gate output from trans T701 (between windings 1 and 2) to turn on triac CR701, passing the current limiting resistor. Thus heating of the current limiting resistor at the normal state is prevented.

(4) Main switching circuit section

The instable DC output is turned on/off by electric field effect transistors Q701 and Q702 with trans T701 as a load to transmit energy accumulated in trans T701 during OFF period of the electric field effect transistors to the secondary side.
The ON/OFF control is performed by the rectangular waveform which is PWM controlled at a fixed frequency (about 100KHz).
Capacitors C706 and C707, resistors R714 and R717, and diode D703 are snubbers of electric field effect transistors Q701 and Q702. Diodes D705 and D707, resistors Q718, R719, and R721, and capacitor C714 are generally called diode CR, which protects Q701 and Q702 from a surging current.

(5) Control circuit section

This circuit generates controlled PWM rectangular waveforms so that the secondary output from trans T701 is stabilized. This function is performed by the control IC (Z701)
Therefore, the master output (+24V for this power) is detected a first and the error is amplified, then the output is transmitted to the primary side and the PWM rectangular waveforms are generated by the control IC (Z701).
In addition, the IC (Z701) has the overcurrent protection feature and the overvoltage signal shut down feature as described later.

① Master output voltage detection/error amplifying circuit and transmitting circuit to the primary side
The master output voltage (+24V) is detected by transistor Q704 to perform error amplification. After error amplification, the output is transmitted to the primary side by photo coupler PC703.
Resistors R735 and R736 and zenor diode D716 are used as he reference voltage of error amplification. Resistors R745 and R746 and variable resistor RV702 are used for detection of error amplification. Resistors R740, R743, R744, and capacitors C736 and C738 are used for phase correction of error amplification.

② Generation of PWM rectangular waveform by control IC
The control IC (Z701) generates PWM rectangular waveform (at pin 5 of control IC) based on the error amplification output transmitted to the primary side by photo coupler PC703.
The frequency of PWM rectangular waveform (the operating frequency of this power source) is fixed to about 100 KHz regardless of variations in loads.
The major supply method of the power source (Vcc) for the control IC (Z701) is changed between when starting the power and when in the steady state. When starting the power, the operation is started with the voltage of smoothing capacitor C712 charged by diodes D708, D718, resistors R727, R785, R703, R786, and diode D709. When in the steady state, the output of trans T701 (between windings 2 and 3) is passed through rectifying diode D713 and converted into a DC current by smoothing capacitor C723, and a DC power is supplied by charging smoothing capacitor C712 which is the power source of the control IC (Z701).

(6) Secondary rectifying smoothing output circuit section

The output from trans T1 is passed through the rectifying diode and the smoothing capacitor. The component part numbers of +24V output are rectifier diode RC704, smoothing capacitors C730, C732, C733, the rectifier diode snubber circuit capacitors C727 and C728, and resistors R731.
The component part numbers of +10V output are rectifier diode RC702, smoothing capacitors C735 and C737, the rectifier diode snubber circuit capacitor C726.
For +5V (VD1, VD2), the output is provided from the dropping chopper from +24V.

[redacted]

SF-1025

MEMO

(7) Regulation after secondary rectifying/smoothing

① +24V
As stated before, +24V is stabilized as the master circuit. In addition, the LC filter is composed of reactor L706 and capacitor C744 for ripple compression.

② +10V
For +10V, the regulator IC is used to stabilize.

③ +5V (VD2)
The output is provided from the dropping chopper of +24V. The component parts are chopper transistor Q703, flywheel diode RC703, and dropping chopper control IC (Z705). The operating frequency of the dropping chopper is fixed to about 37 KHz regardless of the load. The reference voltage for the output error amplification is provided by resistors R752 and R753. Detection is performed by resistors R770 and R771 and variable resistors RV703. Phase correction is performed by resistors R750, R751, R773, R776, capacitors C740, C741, and C745. The control IC (Z705) provides PWM rectangular waveforms at pin 8 and pin 11 based on the error amplification output to drive the chopper transistor Q703.

④ +5V (VD2)
The shunt output is provided from the dropping chopper of +5V (VD2), and stabilization is performed by the regulator IC (Z704).

(8) FW signal

The FW signal provides rectangular waveforms which are synchronized with the AC input.
The AC input is full-wave rectified with rectifier diodes D708 and D710, and the edge section of full-wave rectified AC waveform is transmitted to the secondary side through resistors R727, R785, R728, R786, and R701, and zenor diode D701 by photo coupler PC701. In the secondary side, it is amplified by transistor Q705 based on the signal from photo coupler PC701, and outputted.
The AC input rectifier diodes D708 and D710 and resistors R727 (R785) and R728 (R786) are common section of the control IC (Z701) starting circuit.

(9) Short protection function

① +24V
The +24V line is equipped with fuses F702 and F703, which protect the line. In case of an instantaneous short, the fuses may not be blown off. In this case, the line is protected by the control IC (Z701). That is, a signal is applied through detecting resistors R713, R715, R720, resistor R711, variable resistor RV701, and capacitor C704 to the control IC (Z701) pin 3. The protection operation is performed with this signal level. When the protection operation is continued for a certain period, The control IC (Z701) stops oscillation. Resetting is made by applying the AC power again.

② +10V
The +10V line depends on the protection function of the regulator IC (Z703) itself.
Reset is automatically made. In this protection operation, the other outputs are not affected.

③ +5V (VD2)
This is protected by the dropping chopper control IC (Z705). Variation of voltage drop of detection resistor R759 is inputted to the control IC (Z705) pin 15 and pin 16 through resistor R755, and this signal level is used for protection operation.
Reset is automatically made. In this protection operation, the output other than +5V (VD1) are not affected.

④ +5V (VD1)
The +5V (VD1) is protected by the regulator IC (Z704). Reset is automatically made. In this protection operation, the other outputs are not affected.